

# THE IRON AGE

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## Acid Open-Hearth Steel for Castings

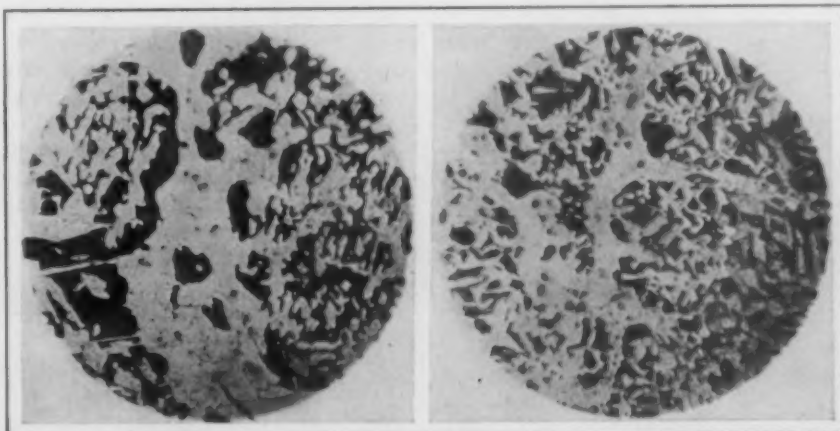
Some Essentials of Good Furnace Practice  
—Make-Up of the Charge—The Proper  
Method of Introducing Ferromanganese

BY EDWIN F. CONE

Steel for steel castings and steel for ingots present two distinct propositions. Though usually made by the same processes, each presents problems to the metallurgist involving important considerations of furnace practice. The main fact to be kept in mind is that the steel incorporated in castings must remain in practically the condition in which it is poured in the congealed casting, whereas in ingots the steel is later subjected to many deformations and heat treatments before it reaches finally the stage in which it is to be used, thus involving decided alterations in crystal-line interrelation. It is only in recent years that castings have been subjected to any really proper treatment. What they receive to-day is usually annealing, which relieves internal strains and modifies the initial structure, affecting the physical properties in proportion. Even this in many cases is not thoroughly done. But such treatment is not to be compared

and treatment of ingots, which is impossible in steel castings.

In the production of steel for castings in an acid open-hearth furnace, as well as in a basic furnace, there are certain fundamental principles that should be followed to insure the best steel in the final casting. Concerning some of these, opinions are divided. It is the object of this article to discuss a few of the principles involved in making acid open-hearth steel for castings.



Photomicrographs (87 Diameters) of Sections, Etched in Nitric Acid, of Acid Open-Hearth Steel Castings Made by Adding the Ferromanganese in the Ladle. The Casting from Which These Specimens Were Taken Was Only 6½ In. Square. The One on the Left Is An Unannealed Specimen and the One on the Right an Annealed One, Each One from a Different Piece of Metal But Both from the Same Heat. The Physical Properties of Each Are As Follows:

	Unannealed	Annealed
Tensile strength, lb. per sq. in.	72,000	78,000
Elastic limit, lb. per sq. in.	42,000	44,000
Elongation in 2 in., per cent.	14.00	11.00
Reduction of area, per cent.	15.30	18.80

The Ill Effect of Occluded Manganese Sulphide, Slag, Etc., Is Manifest from These.

### PROPORTION OF MATERIALS TO BE MELTED

An important factor affecting the final state of the metal is the proportioning of the charge to be melted. It is contended by some that any amount of foundry open-hearth scrap can be used with the requisite amount of pig iron, provided melting conditions are correct. Heats of as high as 75 per cent. of heads, gates and defective castings have been made

to the various rollings and temperature variations occurring in the manipulation of the ingot to the finished rail, shape or forging.

It is important, therefore, that every consideration of character of charge or furnace practice that in any way can affect the composition or condition of the final steel in the casting should be given careful attention—even more so than in the average melting of other steel, though of course nothing excuses carelessness in either case. But it should be emphasized that defects are often corrected in the subsequent manipulation

where no injury to the steel was observable, when such melts have often been incorporated in one solid large casting. It is, however, contended that where such metal has been poured into castings of small section or varied design, defects have often appeared that otherwise were not usually apparent. At best it is poor foundry practice and usually unnecessary except in rare cases, mixtures of various grades of scrap usually producing the better metal. The ill effect of too much constant remelting of steel-casting scrap is undoubtedly a consideration to be emphasized. A

charge that has met with considerable favor is one of about 30 per cent. pig iron and the remainder plate and billet scrap, no foundry open-hearth scrap being used. This make-up has been thought especially productive of the most perfect castings. The necessity for its use is questionable.

Experience has demonstrated, in one foundry in particular where the loss of defective castings was very low, that a charge of 20 to 25 per cent. of low phosphorus pig iron, 30 to 35 per cent. of open-hearth scrap, the balance being plate and billet scrap, produced a metal less subject to checks, excessive shrinkage and blow holes than any other.

*The Kind of Pig Iron.*—The kind of pig iron entering into the charge for steel castings is probably a matter requiring more care than in the case of ingots. It has become generally recognized that pig iron containing any more than 0.50 per cent. of copper cannot be safely used. If much more is used the resulting metal has a tendency to check. Pig iron containing copper has been successfully used if not more than 13 per cent. is charged. Many objections have been made to the use of English pig iron in making steel castings. It has been contended that whenever it has been used, checks and undue shrinkage have resulted. While the writer has had an experience of this nature, the cause could not be located at the time. It was at least a fixed idea in the mind of a pioneer steel foundryman at that time that everything that went wrong with the metal was attributable to English pig iron. In any case it was not due to the composition, unless according to one theory an unusual amount of oxygen was present in it which might have caused injurious results. It is a general principle that it is better to use no more than two brands of pig iron at a time and not to use a mixture of several in one heat. The latter practice has been found to be productive of unsatisfactory metal and castings.

#### INITIAL MANGANESE IN THE CHARGE

The question of the percentage of initial manganese in the charge is important, but one to which very little attention has been given. It is contended by some that the total manganese in the various ingredients making up the charge be not less than 0.80 to 1 per cent. If the materials charged do not show this, then enough ferromanganese should be added early to the charge as it is melting down to make up the deficiency. The presence of the manganese is necessary to neutralize the oxides that may be present or formed in the melting and to flux out part of the other impurities, such as sulphur, etc. The resulting metal is purer and freer from included slag and oxides than when this principle is disregarded. Its adoption insures better metal and castings.

A very effective method of introducing the initial manganese is to use a pig iron containing 3 to 4 per cent. of manganese. Such irons are easily obtainable and the added expense is warranted in the better quality of metal produced, with consequent less loss in castings. These provisions for initial manganese have been demonstrated as decidedly beneficial on a large scale in the experience of the writer.

#### INTRODUCING MANGANESE INTO THE STEEL

Of course the manganese initially in the charged materials or subsequently introduced as ferromanganese in the charge is dissipated as the melting and refining proceed and the charge when completely melted is practically free from this element. To make good steel, manganese must be added to

this molten mass before it is cast into molds. There are two general methods of doing this:

1. Introducing 80 per cent. ferromanganese into the bath of the metal in the furnace.
2. Throwing small pieces of the alloy into the ladle as the metal leaves the furnace.

There is a contention among foundrymen and metallurgists as to which of these procedures is the better. If the first one is followed, the ferromanganese in large lumps is placed on the breast of the furnace so that it becomes thoroughly heated through and is then pushed into the bath, stirred through the slag and efficiently mixed with the metal. The ferrosilicon, 10 to 12 per cent., has been just previously introduced in a similar manner. If the second method is followed, the ferromanganese in lumps about nut size, is thrown into the ladle as soon as the metal has covered the ladle's bottom to the depth of a few inches. In this case also the 10 to 12 per cent. ferrosilicon has previously been introduced into the metal in the furnace as in the first case. As opposed to either of these processes the method of putting both 50 per cent. ferrosilicon and the ferromanganese into the ladle is sometimes resorted to—certainly a bad practice. It is probably not wide of the truth to state that the second of the two methods is used by a majority of the acid open-hearth foundries of the country.

#### MANGANESE IN THE BATH BETTER

It is the contention of the writer that the first procedure is by far the better in producing good steel and homogeneous castings. This opinion is based on the general principle that wherever possible it is better metallurgically and practically to finish to the greatest extent possible the steel in the furnace and not in the ladle. Otherwise the time necessary for the manganese to not only do the work expected of it is not sufficient in the ladle but also its thorough amalgamation with the steel is less likely. This being so, the resulting steel is generally likely to be permeated with aggregates of manganese sulphide, slag or mixtures of the two, greatly weakening its structure and strength. The two photomicrographs illustrating this article show what may happen in such a case. These are from acid open-hearth steel castings poured from steel made by putting the manganese alloy into the ladle. Examination reveals their exceedingly poor structure, permeated here and there with globules of manganese sulphide, slag, etc. The normally expected uniformity in crystalline arrangement is badly broken up, large patches of ferrite being segregated around the foreign substances, slag, sulphide, etc. The physical properties of the steel also tell more.

#### EXPERIENCE OF A LARGE PRODUCER

Further practical demonstration of the correctness of this contention has been impossible in the writer's own experience. However, it is gratifying to be able to present here the results of the experience of one of the largest producers of acid open-hearth steel castings in this country, a firm reputed to make high grade material and to adopt a definite practice only after thorough investigation. The opinion and conclusions of this company, as formulated by its general superintendent, are as follows:

Some time ago it was our regular practice to put 30 per cent. of our ferromanganese charged in the ladle, breaking it up to the size of a hickory nut or slightly larger. This practice was not entirely satisfactory and in three extreme cases we had heats with the last two or three thousand pounds, from a ladle containing 50,000 lb. of steel, giving us metal ab-



normally high in manganese. In one case the analysis of these castings ran about 6.50 per cent manganese. The fracture of the castings was like that of chilled gray iron and they were of course very hard, and the manganese contained was verified by accurate analysis. This trouble was attributed to ferromanganese which had become coated with slag and had not properly fused. We have verified by actual tests that this alloy, which has been intentionally covered with slag, is extremely hard to fuse.

One of the other conditions which we have found is that when we add ferromanganese in the ladle there is a possibility of not getting a perfect mixture, and we have had castings which showed cavities on the cope side below the surface which we could not attribute to anything but manganese which was not thoroughly fused when the steel entered the mold.

Our metallurgist, who has followed this matter a great deal, feels that our steel shows a greater tendency to hot cracks and blowy condition when manganese is added to the ladle than when it is put through the bath. Our laboratory records seem to indicate that we are not able to control our carbon and manganese analysis within as close a range by the first practice as we are able to do with the latter.

While it is very hard to get any absolutely conclusive data, we are convinced from careful comparison of a great many tests which we have made that our steel will run 2000 or 3000 lb. per square inch higher in ultimate tensile strength when the manganese additions are made through the furnace rather than in the ladle.

As our manganese loss when we put all of the alloy in the furnace is between 30 and 35 per cent., the actual loss of ferromanganese on a 25-ton heat will run a little less than \$5 per heat with manganese at its normal price. We generally add manganese to finish 0.60 to 0.70 per cent. in the castings.

We feel that as far as we are concerned we are justified in continuing our present practice of putting no manganese in the ladle, notwithstanding the increased cost.

This important evidence is of great weight so far as the metallurgical phase and the desire to make the best castings are concerned. As to the element of cost, unquestionably introducing the alloy into the ladle is cheaper, as the loss of manganese in the furnace is at least 25 per cent. greater than in the ladle. But cheapness is not usually the best policy in the long run.

#### POURING TEMPERATURE OF THE METAL

The question of metal temperature in pouring castings is an important one as is also the character of the slag. The usual aim is to secure a degree of heat sufficient to permit a pouring of various molds lasting from one-half to three-quarters of an hour in the case of a 25-ton heat. Anything higher is dangerous as bordering on overheated metal with its consequent baleful results. A pioneer in the business once remarked to me that he would rather see a slight skull or ring in the ladle after pouring than none at all, feeling certain then of proper results.

#### OREING DOWN THE HEATS

The proper use of iron ore in eliminating carbon from the bath is another factor of extreme importance in producing sound castings. It can be stated as a principle of good practice that no ore should be used after the carbon in the bath has reached 0.40 to 0.50 per cent. From that point its elimination should be natural and not forced. The natural elimination favors a quiet metal; the forced elimination, a wild metal, often permeated with gases, part of which often remain in the metal until it solidifies. The result is of course blowy metal and defective or returned castings. The tendency to break this rule is inspired by a desire to make

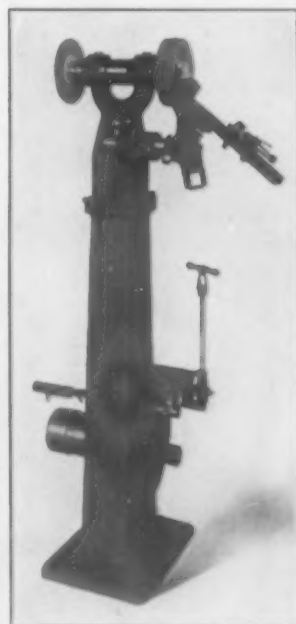
quick time or large output to the sacrifice of the best in quality.

As to the use of aluminum and other medicines in the shape of some ferroalloys, this is a subject to be discussed by itself. For regular carbon steel castings, it should not be necessary to resort to any such cure-alls when proper melting principles are followed.

Demand for better products is growing more insistent. Producers desiring to keep pace with the pronounced tendency to a higher plane must take advantage of every point that makes for this end. Signs are not wanting that point to the possible fruition of efforts to make steel in an electric furnace competing with the open-hearth on a tonnage basis. Unquestionably electric steel is superior, other things being equal. But proper regard for fundamental principles in open-hearth practice always results in a first-class metal. Since much of the steel made in steel foundries is melted by men who are not metallurgists, too much attention cannot be paid to the plain principles here recited.

### New Line of Drill Grinding Machines

The F. E. Wells & Son Company, Greenfield, Mass., has added to its machinery products a line of drill grinding machines, which are furnished in three types. The head and the grinding fixture are the same throughout, but in one the head is mounted on a plain column and is driven from an independent overhead countershaft; in another the countershaft is attached to the column and is belted directly to the main line shaft; while in the third type the drive is from a motor mounted at the base, the belt being inside the column. As will be noted in the illustration, the machine is of the standard type. A 6-in. cup wheel is mounted on one end of the spindle for the sharpening of drills, and a  $\frac{5}{8}$  x 6-in. point trimming wheel is on the other end.



One of a Recently Developed Line of Drill Grinding Machines Having a Special Arrangement of Drive for Each Style

A portable oxy-acetylene welding and cutting outfit has been placed on the market by the Imperial Brass Mfg. Company, 1210 West Harrison street, Chicago, Ill. The principal feature of the apparatus is the mixing of the oxygen and the acetylene. Before entering the mixing chamber of the torch, the oxygen, under high velocity, passes through a spiral groove. This imparts a whirling motion to the oxygen which is relied upon to mix it thoroughly with the acetylene before the gases reach the combustion point. A special alloy with a high melting point is used for the welding and cutting tips and the design of the latter is relied upon to prevent burning out. The regulator which is of a special type will shut off automatically in case of emergency when the outfit is being used for cutting.

The Parish & Bingham Company, pressed sheet metal products, moved March 8 to its new offices at 10,615 Madison avenue, Cleveland, Ohio.

# Student Engineers Teach Workmen\*

An Important Movement to Enlarge  
the Worth of the Worker and  
the Perspective of the Employer

— BY J. PARKE CHANNING —

These days of great industrial and social problems in America produce many suggested solutions and great changes. The practical engineer and employer of labor views these problems differently from the labor leader or the social reformer, but, as never before, he is sincerely interested in solving them in a way that will be just to all.

The inevitable tendency of the day is toward "industrial betterment," "safety," "industrial education," "efficiency," and the many other things which have become so familiar to progressive employers. There is no longer any question that these things are worth while from both the human and

ill-feeling, labor difficulties, and many strikes could not be avoided if such men had the right attitude.

Is there any way of remedying this condition? If this particular difficulty can be solved, if these young engineers, many of whom are our coming leaders of industry, can be given the right perspective and the right understanding of these other problems in addition to fair, sympathetic methods of handling men, many of our other problems will be solved—not at once, but gradually and permanently, as these men make good and become influential in paths of industrial righteousness and industrial peace. Many progressive employers of today



How Part of the Noon Hour Is Taken Up in One Shop

economic standpoint. They "pay" in dollars and cents.

The very center of final success in improving conditions and increasing the efficiency of workingmen must be the spirit of fairness and a knowledge on the part of the employer of how to deal, sympathetically and intelligently, with his employees. Every progressive employer knows how greatly he desires foremen, superintendents, managers and others who possess these qualities. On the other hand, we are all familiar with serious mistakes made by young graduates of engineering schools who have had no opportunity to develop these qualities, and who have no real appreciation of the worth of the workers. Indeed, one wonders whether much

have enlarged their own perspective and realize the great importance of enlarging the perspective of those who shall follow them.

How can it be done? For seven years a movement has been making rapid progress in engineering schools with the purpose of helping to solve this very problem. It was started at Yale in 1907, by the Young Men's Christian Association, when some engineering students were led to get in touch with workingmen and boys in New Haven. The idea was to render service by teaching them English and other subjects and in turn to learn their ways, ideas, customs, and how to deal with them intelligently. Friendly, mutually helpful personal contact was the basic principle. This was the beginning. Do not confuse it with "social service"—it was this, and much more. The reaction on the engineer was the main object sought. The idea worked out so

\*Extract from a paper presented at the New York meeting of the American Institute of Mining Engineers, February 15, 1915. J. Parke Channing is vice-president, the Miami Copper Company, New York City.



successfully that a number of men saw great possibilities in it, and the whole conception was greatly enlarged. Under the name, Industrial Service Movement, it has spread to 200 other colleges and technical schools in the past seven years, and has justified itself from every point of view. It is really helping in a vital way to solve the special problem we have been discussing and other problems as well. To put it briefly:

The plan is to bring engineering students and industrial workers together to their mutual understanding and their mutual good.

The purpose is to get workingmen educated and educated men to work. To send men out of college with a new sympathy, a new vision and a new determination to help.

The principle is fraternity—not to go down to help others or to ask others to come up and be helped, but rather to go with them, not in any sentimental way, but in a spirit of common sense brotherhood.

The method is to put college students up against real opportunities for the kind of service which appeals to them, such as teaching foreigners English and citizenship; instructing American workingmen in technical subjects; leading clubs of working boys, etc. There is opportunity for every leader's peculiar ability to assert itself, in any way that is real. Other methods will be described later.

Accomplishment shows that during the past year 3500 students from 200 colleges have engaged regularly in industrial service; 3000 graduates are active in industrial betterment as a result of interest acquired while at college, during the past seven years.

Leadership rests in the Young Men's Christian Association, through local branches, state committees and the industrial and student departments of the International Committee.

Co-operation provides for the movement working locally through the Young Men's Christian Associations and any other recognized agencies for industrial and social betterment in the community. Professors and students, employers and employees, engineers and social workers heartily co-operate.

The significance of it is that experience proves that men interested in this work at college go out into the larger world with a new vision and a new attitude and sense of responsibility. These men will largely determine whether conditions shall be good or bad and whether the human factor will be given fair consideration. How, better, can the problems of capital and labor be solved than by mutuality, good will, efficiency and character in business? The nation's hope is in the coming leaders who shall follow us and who possess such essential qualities of success. The development of such leaders, with their continually increasing capacity for service, is the ultimate purpose of the Industrial Service Movement.

It may seem surprising that 3500 engineering students, each carrying a heavy course of study and with many other interests, can find an evening or two each week to engage in some form of definite service, without any financial compensation. But such is the case, and on the whole a careful survey of their work reveals efficiency and permanency in a high degree. If industrial men are at first suspicious, their suspicion soon wears away in the face of frankness and friendliness. If the employer has any doubts, they do not last long. One may travel around the country and observe students teaching foreigners in railroad box cars, stores, clubs, halls, pool rooms, restaurants, and boarding houses as well as in the more dignified meeting places—schools, churches, settlement houses, and factories.

One may see American workingmen instructed in mines, shops, and labor-union headquarters. One may look with interest upon recreative games, talks, first-aid and safety promotion in all sorts of places at noon, afternoon, evening and midnight. And one may see 500 men crowded around the machinery of a huge plant listening to a straight noon-hour talk on clean living, character-building and vital religion. We have looked with amazement on 50 factory boys following enthusiastically a college football captain who took enough interest in them to organize a boys' club or a factory athletic league. It has all been done in the finest kind of spirit, without patronage, with modesty and with efficiency. And during the past year those 3500 student leaders reached over 60,000 workingmen and boys in a very personal and directly helpful way. The secretary of this movement has talked with hundreds of employers and college professors throughout the country and all seem enthusiastic over what has been accomplished.

But what has this to do with engineering? Just this—that every one of these 3500 students would be willing to say that he has gained far more than he has given. Furthermore, a study of the situation proves that he has gained in large measure the very qualities he needs—an appreciation of workingmen, adaptability, leadership, a knowledge of how to deal with men in a way to get results and to avoid harmful labor difficulties. In general, he learns that all men are men, regardless of race, nationality, color or creed, but that men must be dealt with very differently; he learns that it pays to win the leaders of men if one desires to win the men themselves; that the work, home and leisure life of industrial workers play a large part in determining efficiency; that a man's working associates may largely influence the quality of work he does; that helping men to concentrate on their work, though not at the expense of mental and physical welfare, increases output; that friendly competition, without driving men, helps break records; that reasonable relaxation and recreation pay both from the human and economic standpoints; that visitation of other plants and stimulation of new ideas in various ways may mean a money saving to the company; that loyalty of the men is one of the employer's greatest assets; and that character counts most of all. More than this, he learns to understand men, he learns how to sympathize with the other fellow's point of view and how to handle men successfully. Is this not worth while? Who can foresee what the future will hold for these men in the way of tremendous opportunities and responsibilities?

#### An Interesting Test of a 10-In. Hacksaw Blade

A test of a hacksaw blade, which was calculated to show its non-breakable qualities, was recently made by E. C. Atkins & Co., Indianapolis, Ind. In this test a 10-in. Atkins non-breakable blade was coiled down to 1 in. After the test the blade was straightened and ran to the full life of an all-hard blade. It is emphasized that breakage due to an awkward thrust or the blade being permitted to bind in the cut, which has heretofore been a source of great expense in operating hacksaw blades, is entirely eliminated with this new one. These blades can be supplied in lengths from 8 to 10 in., and in widths from  $\frac{1}{2}$  to  $\frac{9}{16}$  in., the number of teeth ranging from 14 to 32 per in.

The Utah Junk Company, Inc., Salt Lake City, has under construction a merchant bar mill which will be completed about the middle of April. The officers of the company are: President and general manager, N. Rosenblatt; secretary and treasurer, S. Rosenblatt. A new company is to be incorporated to operate the mill.

# Economical Handling of Odd Machining Jobs

## Suggested Operation Schemes for Occasional Lots or Single Pieces of Horizontal and Vertical Turret Lathe Work

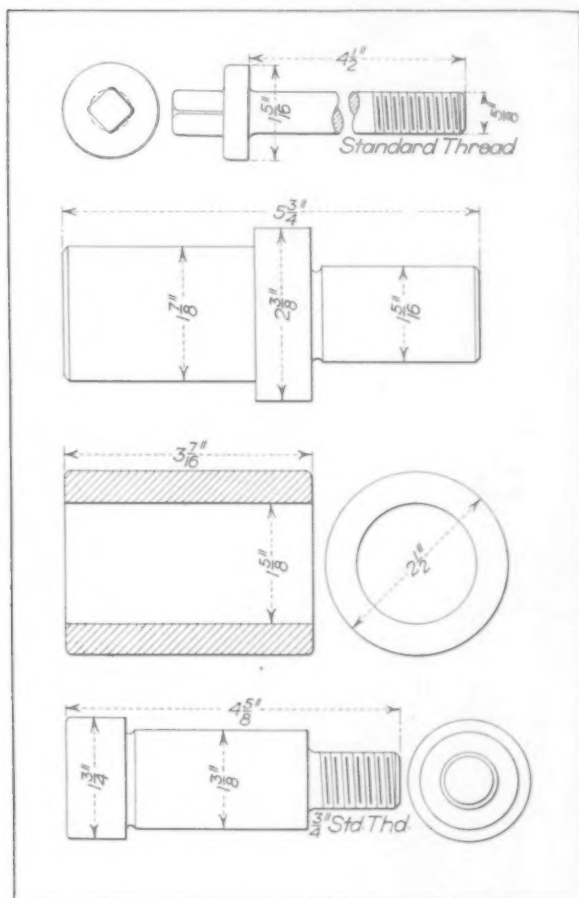
— BY ALBERT A. DOWD —

The machining of odd jobs or single-piece work in the factory is usually attended with considerable loss of time which can in many cases be avoided by a re-adjustment of the conditions under which the

It is a fact that in many cases the operator does not know what his next job is going to be, for the foreman may not give him a new job until he has finished the one on which he is at work. If the job is given out in advance the operator or workman has a chance to look over the blueprint and get together the necessary tools for the new work while the old one is still in the process of machining, so that there need be very little loss of time between jobs due to lack of preparation. In factories where the premium system is in vogue it is sometimes possible for a man to have two machines in operation at the same time or to start a piece of work and let an apprentice finish it. To avoid unnecessary fussiness the foreman giving out the work should inform the operator how accurate it is to be, so that a loss of time will not result from extreme accuracy when this is not essential.

A suitable tool equipment is a great advantage on work of this kind, and blocks, parallels, straps and bolts should be easily accessible so as to assist in setting up. Take a lathe job for instance, in a department devoted to the manufacture of special tools, boring bars, reamers, cutters, etc.; it will usually be found that one or two of the men are naturally rapid and quick to grasp the requirements of a special job. These men should be selected for odd job work in preference to some of the others and may be allowed to keep a certain amount of equipment ready to hand for this purpose. In this way a considerable amount of time can be saved and the work produced to good advantage.

In screw machine work the manufacture of special screws, studs, etc., in lots of from 4 to 10 pieces, is usually costly, for the reason that there is a lack of preparedness for short jobs, and as a consequence such work is frequently done by an apprentice in the tool department at a low labor cost. There are, however, several other ways in which odd lots of this kind can be economically produced, these being dependent upon the conditions which obtain in the factory. Each manufacturer must decide upon his own method of procedure according to the demands of his output. If many jigs and fixtures are being built constantly there will be many small pieces to be manufactured and it may be found profitable to have a couple of operators using different sized machines to whom work of this kind can be given. When the nature of the general run of work will permit it, these men should not be given large-lot production work, but should be kept as far as possible on small lots. If these operators are provided with adjustable turning tools and a conveniently available assortment of dies and holders, screws and studs in special sizes can be produced very rapidly even when wanted in small lots of four or five pieces. The turret lathe should be provided with a cut-off slide. I have seen a man experienced on this class of work set up his machine and make up eight special screws,  $\frac{3}{4} \times 4\frac{1}{4}$  in., with extra large head in 45 min. This time included the changing of collet jaws and die-heads. This particular man often turned out in the course of a day 12 to 15 lots of



Some Characteristic Pieces of Horizontal Turret Lathe Work

work is done and a little more care in the handling of work of this character. Cylindrical pieces are especially expensive when made up one at a time or in lots of four or five pieces, the cost often running two or three times as much as it need to. As a general thing pieces of small size are machined on a lathe, while the larger variety of work necessitates the use of a larger machine such as a vertical boring mill or other machine of similar nature. Some of the reasons why short jobs cost so much are setting up time and preparation for the work very slow; feeds and speeds used too conservative; lack of proper equipment for handling work of this character to advantage; poor judgment on the part of the foremen in giving out the work to men of insufficient experience who spend so much time in determining how to hold the piece and looking up blocks, clamps, etc., that by the time they have decided and got together the necessary tools, a more experienced man would have finished the job and been ready for another; fussiness over unimportant dimensions and loss of time studying over a blueprint.

screws of various kinds, in lots ranging from 6 to 10, and it is obvious that in cases where the amount of small odd lots is sufficient to warrant it, no more profitable method could be asked for. This operator took a great deal of pains to group his work as far as possible in order to avoid the necessity of changing collet jaws and dies. The greater part of the work was required within a day or so, sometimes in even less time than this, but even on rush jobs it was found more economical to do the work in this way rather than on a lathe. In the case of a man having short jobs continually given him, if he is at all ingenious and clever at the work, he becomes expert in setting up and adjusting tools and takes advantage of every short-cut to reduce the production time. It is decidedly unprofitable to give out short jobs of this kind to Tom, Dick and Harry, because in many cases they spend so much time in setting up the machine that the cost of production is increased to such an extent that there is no economy in the method.

For single-piece chucking work ranging from 10 to 24 in. in diameter a vertical turret lathe with turret side head may be used to good advantage. The nature of this type of machine is such that it can be quickly adapted to a variety of work on castings or forgings, and although it is considered more profitable to keep it on regular production work, it can often be switched off to handle a single piece to good advantage. When the odd pieces are not required immediately they can be set aside until a certain lot of the regular production work has been completed, after which they can be handled successively according to the needs of the particular cases. In many cases the tooling requires very little changing and the observation stops, which have been used on the preceding job, need not be disturbed. As a matter of fact, the machine can be handled by an experienced operator much as an engine lathe might be, obtaining the various diameters by calipering. There are occasional instances when it may be found profitable, as in turret or screw machine work, to keep one machine and operator on short jobs and small lots of production work, but this depends entirely on the class of work to be handled and the number of odd jobs. Some of the advantages derived from the use of a machine of this type on work of the character mentioned are the ample power available and the facility with which the machine can be set up. The ingenuity of the operator, ability to read and grasp the essential points on a blueprint rapidly and the accuracy of his work are all important factors which must be considered in attempting to handle single-piece work on this type of machine. With an operator having these attributes, both light and heavy chucking work within the range of the machine can be handled usually with a saving of from 50 to 75 per cent. over lathe methods. A few examples of work in small lots which can be profitably machined on either turret lathe or vertical machine are given here with suggestions for tooling.

The examples of horizontal turret lathe work illustrated form a group of characteristic pieces which in lots of from 2 to 10 are frequently machined either on the engine lathe or in the tool department, and with the single exception of the locating stud, the second piece from the top, they can all be machined to good advantage on the horizontal type of turret lathe. Take the screw shown at the top for instance, which has an extra large collar head, but which aside from this one point is of standard size. Four of these screws are called for and if machined on an engine lathe would require from 1½ to 3 hr., depending on the skill of

the workman. The actual machining time on a Pratt and Whitney horizontal turret lathe was 20 min., and the operator spent about the same time in preparation, making 40 min. in all, a saving of at least 50 per cent.

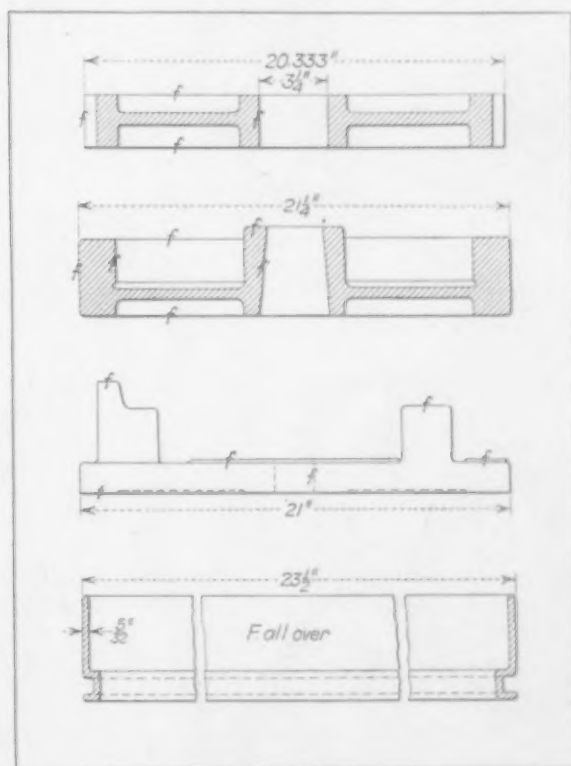
The locating stud cannot be profitably handled on a screw machine on account of the portion, at the left, as there was but one piece to be made, so the engine lathe in this case has the advantage over the other machine.

The four bushings, which are next to the bottom piece, were made from bar stock on a screw machine, but were finally turned on a lathe to ensure concentricity. Stock was drilled, bored and reamed on the screw machine and cut off to length, including setting up time of the machine, in 80 min. A man would have spent from 2½ to 3 hr. in doing the same work on an engine lathe. Here also a saving of approximately 50 per cent. is apparent.

There were six special studs, which are shown at the bottom, to be made and the screw department completed them in 65 min., including the setting up of the machine. It would have taken a man a half day to machine them on a lathe.

Many other instances of work of this kind could be noted, but the cases illustrated are representative of pieces commonly required in small lots which can be economically machined as noted.

The various pieces of vertical turret lathe work illustrated are odd jobs suitable for machining on the vertical turret lathe, and with the single excep-



Odd Pieces Suitable for Machining on Vertical Turret Lathe

tion of the bottom piece only one of each was required. There were two such pieces to be machined from heavy ring forgings to the thin contour shown.

The top piece is a large spur gear, and the next two are respectively a clutch pulley and a fixture body. The surfaces to be finished are indicated by finish marks on the drawings.

The tool layout and method of machining the bottom piece are clearly shown, and attention will be called to the general utility of the set-up in connection with the machining of the other pieces.



The layout for the most difficult piece is shown principally to illustrate the ingenuity displayed in setting up and machining a difficult piece of work in such a way as to produce it in the least possible time and without causing distortion.

Previous to the machining operations shown, the steel ring forging *a* is taken to an upright drilling machine and a hole drilled to receive the short pin *b* which acts as a driver against the side of one of the chuck jaws. By using a driver in this way it is not necessary to set up the jaws as tightly and therefore less distortion is apparent in the work. The piece is set up on the table so that it rests on the shoulders of the three jaws *c*, and the work is gripped by the inside as shown. While held in this way a clamping groove, *d*, is cut on the inner surface of the ring by a tool, *e*, in the tool holder *f* in the main head turret, the tool being grooved on the end to break the chip and make the cutting action easier. After the recess has been cut the three clamps *g* are placed in position close to the jaws with the wooden blocks *h* acting as supports for the tails of the clamps. The bolts at *i* are of the T-variety and enter the table T-slots, so that adjustment can be quickly obtained. Before setting up the clamps some of the pressure on the jaws is released so as to avoid distortion, thus allowing the clamps and driver to do most of the work. The main head turret is now indexed to bring the tool holder *j* carrying the roughing tool *k* into position so that it can be started in removing a portion of the stock at *l*. The tool *m* in the side head takes a roughing cut across the top of the ring and then is fed down along the outside of the forging. The inside and outside tools can be working simultaneously, and being opposite each other they serve to support the work while cutting so that there is less liability of its being sprung out of shape. Two roughing cuts are taken on the inside of the ring, and during the second of these the recess *n* is cut by the tool *o* in the side head, the width of the tool

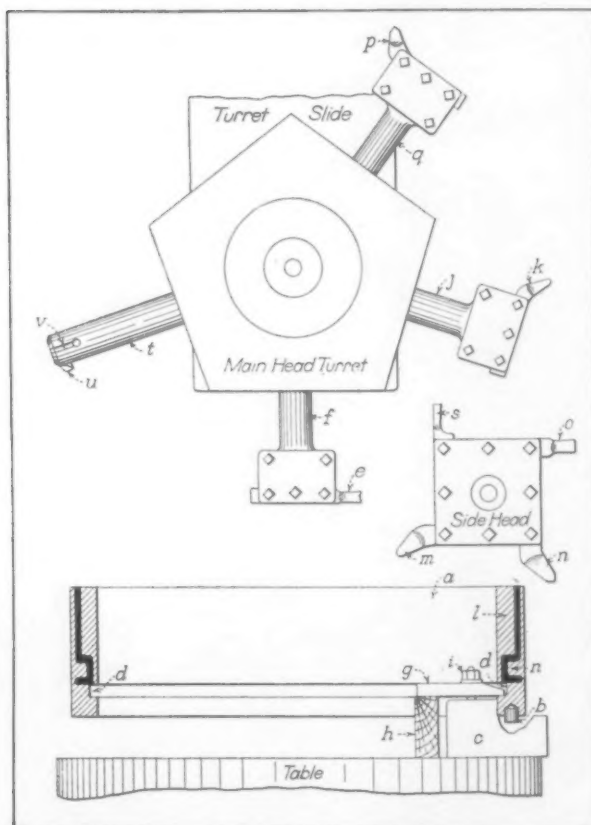
being slightly smaller than the size of the recess, so as to allow a light finishing cut to be taken. The finishing tool *p* in another holder, *q*, in the main head is used to complete the inside finishing while the tool *r* in the side head works in conjunction with it on the outside of the ring, the final finishing cuts being very light in each instance. The parting tool *s* separates the finished piece from the remainder of the forging, leaving the work complete in one setting, machined accurately to size without distortion. It should be noticed that all the tools required are of the simplest kind, such as are ordinarily found among vertical turret lathe equipment, and the labor in setting up the machine ready for work requires very little time.

The flexibility of the equipment is such that the upper pieces can be readily machined by it by the addition of a suitable boring bar, *t*. The top piece is held by the inside in the same set of jaws reversed so that the tail of the jaw is toward the center of the table. Side head tools *m* and *r* are used to turn the outside of the blank, while *k* and *p* face the rim and hub. The boring bar at *t* rough and finish bores the hub with the slip cutters *u* and finally reams the hole with the flat floating reamer blade *v*. Tools for this type of bar are a part of the essential equipment of a vertical turret lathe and may be obtained in a variety of sizes to suit any size of hole. The second setting requiring only the facing of the hub and rim is done by the same tools as those used in the first setting, the work being held in a set of soft jaws by the surface previously machined.

The second piece is held by the rim in the first setting and machined with same tools, but the main head turret is set over to produce the correct taper in the hub hole, which is bored to size and not reamed. The rim is partially undercut by the tool *e*, which is transferred to the side head for this purpose in substitution for *o* or *s*, which are superfluous. For the second setting the piece may be located on a vertically floating tapered bushing on a cylindrical stud in the center hole of the table or it may be held by the outside finished surface in a set of soft jaws as in the preceding case, depending somewhat on the requirements for accuracy. The bushing method will give more accurate results but requires the making of the parts used, while the soft jaw method simply requires the boring of the jaws in position on the table. If care is used, the latter method can be made to give very satisfactory results and is both cheaper and quicker.

The third piece can be set up with the smooth side uppermost in a set of standard jaws on raising blocks and held by the outside of the rim while it is faced and bored with same tools previously used with the exception of the boring bar, which must be exchanged for another of smaller size. In the second setting a plug in the center hole is used as a locator and the work is driven by screw dogs in the table T-slots. The facing operations are performed by the same tools used in the first setting, both the side and main heads being utilized.

Many other examples of work could be given to illustrate the possibilities of this type of machine on single-piece work, but the instances noted are sufficient to give an idea of its flexibility and the methods by which it can be adapted to a variety of conditions are clearly apparent in the examples shown. It will be found profitable for any factory manager to inquire into the methods by which single-piece work is produced in his own factory, so that he may be able to judge whether he would be the gainer in adopting some of the processes mentioned in this article. So much depends upon the



The Tool Layout of a Vertical Turret Lathe for Machining the Pieces Shown

conditions governing the work in different factories, that it is obviously impossible to practice a method in one factory under certain working conditions which may be entirely at variance with the conditions obtaining in another factory where the method may have proved successful. Each executive must govern himself in accordance with the requirements of his own factory, but it is the hope of the writer of this article that some of the suggestions given may prove both interesting and profitable.

### A New Line of Cutting Tool Holders

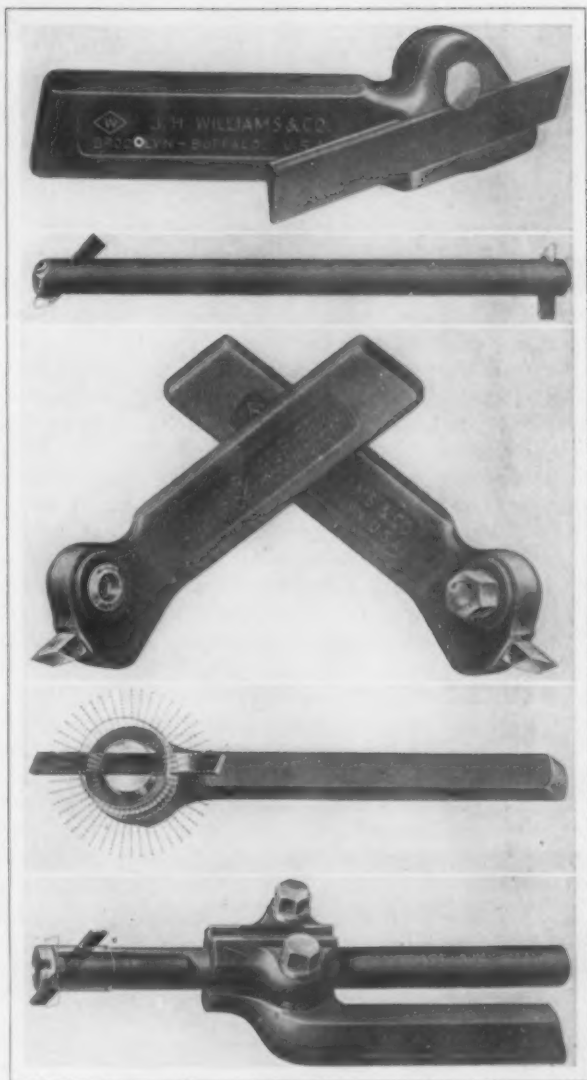
A cam lock for holding metal cutting tools has been developed by J. H. Williams & Co., Brooklyn, N. Y., and is the distinct feature of their new line of turning, cutting-off, side tool and threading tool holders. A cam made of specially hardened and tempered tool steel has been substituted for the regulation set screw. It has a very slight rise to give it high gripping power. The cutting tool is locked by a turn of about 30 deg. When the cutter is loosened and removed the cams can be slid out of the holder. Both countersunk and hexagonal nut types of cams are provided. Drop-forged wrenches are provided for locking and are designed to give so large a binding force that the workman will not be tempted to strike the handle a blow, which is often the cause of damage to holders, etc. It is mentioned that this cam type of lock eliminates the more or less general damage that occurs from twisting off the set screw head. Both right and left hand turning tools are provided, with straight or offset shanks, and straight or drop heads, and each type is furnished in six or more sizes to take cutters from  $\frac{1}{4}$  in. to  $\frac{3}{4}$  in.

The cutting-off and the side tool holder is combined in one, furnishing a material reduction in the shop tool investment. A suitable variation of the cam is used for this tool, as shown in the accompanying illustration. It is designed to bring the broad edge of the tool at the top, which adds to its life by carrying away the heat generated in the cutting better than does the usual narrow one.

A threading tool holder for both roughing and final finishing touch has been brought out with a lockable spring head. This consists of a special headless cam that is easily removable when the spring head is desired for the finer finishing cuts.

The boring tool holder is of entirely different design. It is made to take all sizes of boring bars, rounds, hexagons, etc., within its proper limits without the aid of shims, bushings or other fillers. This is accomplished by a cap, provided with large and small grooves on opposite sides. The cap holds the bar against the grooved shoulder of the holder shank, by means of two tightening screw nuts. Boring bars are made in four sizes, from  $\frac{3}{16}$  in. to  $1\frac{1}{8}$  in. in diameter. In the illustration a sleeve bar is shown in place in the holder. It is a new type of bar. The end is tapped to receive the clamping bolt, which has two holes to take the tool in either a straight or angular position. The sleeve with similar holes butts against the bar. When the cutting tool is slipped through the holes in the sleeve and bolt, the latter is tightened and binds the tool in place. A plain bar is also supplied for similar cuts, equipped with set screws. Each type is made in four sizes to take bars from  $\frac{1}{4}$  in. to  $1\frac{1}{8}$  in. in diameter.

The new planing tool holder has 28 adjustments, as compared with seven in the standard tools now in use. This multiplication is attained by 28 radiating serrations, corresponding to similar ones in the washer or adjustment ring. To prevent the



Various Types of Cutting Tool Holders. At the top a Cutting-off and Side Tool Holder; next, a Plain Boring Bar; in the center, Right and Left Hand Turning Tool Holders; next, a Planing Tool Holder; at the bottom, a Boring Tool Holder with a Sleeve Bar in place and Cutter Set in Angular Position

well-known and annoying wearing down of the cutter seat, this ring is hardened. The locking nut has a spherical seat which brings it in line with the strain, doing away with all side strains here as well. This holder is particularly adaptable to heavy lathe work, and wherever offset tools might be used. Six sizes are provided to take cutters from  $\frac{5}{16}$  in. to  $1\frac{1}{8}$  in. in diameter. The line of tool holders is supplemented by a knurling holder, provided with three sets of standard knurls. A complete line of cutters is provided for each different holder and purpose.

### New General Electric Mazda Lamps

The Edison Lamp Works of the General Electric Company, Harrison, N. J., has developed a line of vacuum Mazda lamps in the 25, 40 and 60 watt sizes. The lamps, which will have a rated average life of 600 hr., are provided with concentrated filaments that are believed to give a greater vertical distribution of light than the regular Mazda lamps of the same sizes. For this reason the lamps are designed to be used where natural distribution of light downward is required, and can be placed in existing sockets and fixtures, the bulbs being the same size as the corresponding regular lamps.

The Dominion Iron & Steel Company, Ltd., Sydney, N. S., is to install a plant for the utilization of by-products of the coke ovens to manufacture toluol and benzol.

# Making Instruction Cards from Time Studies

How Time Study as a Part of the Taylor System of Management Is Analyzed—Establishing Standard Times

BY DWIGHT V. MERRICK\*

In manufacturing, there are two things which, except in a few instances, have been woefully neglected. One is the matter of standardizing the machines used in manufacture, including the tools used on them. The other is the matter of knowing accurately how long a time is required to do a given piece of work.

A few words will suffice to describe the matter of standardizing the machines and tools used on them. In a shop there may be two engine lathes of the same capacity, but of different makes, used to produce the same part. Unless these two lathes are to all practical purposes alike, from the standpoint of power, speed and feed, they cannot be expected to produce the same piece in the same time.

Carl G. Barth has been a pioneer in this work. Unless machines have been thus standardized, the man responsible for the completion of the work cannot expect the same daily production from each machine. Furthermore, the operators of the two machines cannot, with equity, be paid at the same rate. Since anyone who has investigated the matter knows that machines of like nature and capacity do vary considerably according to the maker, it is obvious that, when establishing ideal conditions in a plant, time and money must be spent in standard-

izing the machines and tools so that machines of similar size and character will have the same capacity for producing work. (Those shops today in which this standardization has been brought to the highest point, are those shops in which the Taylor system of scientific management has been introduced, and are the exceptions previously referred to.)

Granting, however, that the conditions outlined here have been met, and that every reasonable provision has been made for guiding work through a plant, the fact remains that in the average establishment today there is no one who can say with authority what time will be required to accomplish a given task. And yet, a little reflection will show that both the men employed to do the work and the management responsible for having the work done can work to the best advantage if such times are known with a reasonable degree of accuracy. And it is this which leads to time study.

Time study is an analysis of the work which is being done, resolving this work into its fundamental elementary operations, and a study of these elementary operations by means of a stop watch to ascertain which are necessary and useful and which are unnecessary and wasteful of time and energy, and also to ascertain the time which a first-class

\*Consulting engineer, New York City.

OBSERVATION SHEET													DATE									
OBSERVER'S NAME <i>GAUTHIER</i> MACHINE NO. <i>4XE</i> DATE <i>12-8</i> 191 <i>7</i>																						
WORKMAN'S NAME AND QUALIFICATIONS <i>W. SMITH</i> * <i>1876</i> GOOD SUBJECT																						
PIECE <i>20204 FRONT CUSHION TOP</i>																						
OPERATION <i>STITCH PLEAT</i>																						
DETAILED OPERATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	AVERAGE	MINIMUM
1. LAND TOP ON MACH & START AT A	21	17	19	15	20	17	11	14	20	11				14	28.50						180	15
2. STITCH FROM A TO B	26	24	28	25	35	24	28	21	27	25				07	11.00						0771	07
3. MOVE TOP OVER C & START AT C	30	37	40	42	54	36	40	36	40	43				12	21.00						145	12
4. STITCH FROM C TO D	82	64	67	70	83	68	70	157	66	70				23	10.00						236	23
5. MOVE TOP OVER C & START AT E	97	81	84	85	98	93	85	200	80	87				12	12.50						153	18
6. STITCH FROM E TO F	185	112	115	113	124	122	120	223	109	113				23	24.50						236	23
7. MOVE TOP OVER C & START AT G	134	120	128	129	137	135	134	237	123	126				13	8.00						138	11
8. STITCH FROM G TO H	155	138	145	147	155	152	150	253	140	142				15	5.00						161	14
9. PARTLY TURN TOP & START AT E	183	167	174	167	173	178	173	275	160	165				18	32.00						231	19
10. STITCH FROM E TO G	199	176	184	175	183	188	182	285	168	172				07	26.00						083	07
11. MOVE TOP OVER C & START AT C	210	198	203	193	199	236	235	303	185	179				15	19.50						179	15
12. STITCH FROM C TO I	342	223	224	219	223	267	265	323	215	219				23	12.50						270	22
13. MOVE TOP OVER C & START AT A	369	247	252	245	247	286	284	351	232	241				17	33.00						226	11
14. STITCH FROM A TO H	398	273	274	272	270	313	314	378	260	265				23	16.50						261	22
15. MOVE TOP OVER C & START AT B	419	300	292	292	289	335	335	391	287	284				18	16.00						201	17
16. STITCH FROM B TO F	438	317	318	309	304	358	353	409	304	303				15	19.00						176	14
17. REMOVE C & LAND TOP ON PLE	454	330	324	325	320	361	365	421	321	318				11	24.00						147	12
18. TOTAL AVERAGE											3.558			1905							243	

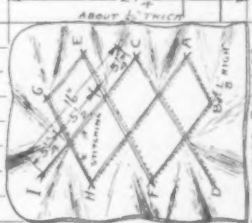


Diagram showing the layout of the cushion top with points A through I labeled for stitching operations. Dimensions include 27 1/2" and 26 1/2".

LOAD MACH

LINE	COIN	START	FINISH	TIME
13	1	2.18	3.10	1.00
5	8	0.36	0.54	.28
6	6	0.78	2.10	.32
6	6	0.65	0.75	.10
11	7	1.73	2.12	.39

\* RETREAD NEEDLE

REFERENCE NOTES SHOWING FOREIGN ELEMENT WHICH ENTER INTO THE STUDY. THESE FOREIGN ELEMENTS MAY OR MAY NOT HAVE A BEARING ON THE FINAL INSTRUCTION CARD.



workman will require to accomplish the job.

Usually a job analyzed into the elementary operations composing it will be found to have many operations that can be eliminated or modified and so result in a better method of performing that particular job.

TWO JUSTIFICATIONS FOR TIME STUDIES

At the present time there is a twofold reason for making time studies. Time studies when conscientiously taken and carefully worked up under the supervision of a competent man lead to the establishing of records in a plant from which the time required to do a given piece of work may be computed with reasonable accuracy. Further, time studies taken in different plants on different classes of work result in the accumulation of data which may ultimately be scientifically worked up and tabulated in such a way as to give to the world definite standards for computing times on work.

Considering, then, the objects to be obtained from time studies, it follows that the men who make them and the men on whom they are made should be carefully selected.

The man who makes studies is known as the observer and should be a person naturally endowed with ability to observe and record, with accuracy and detail, the work to be studied. It is essential that he use the most impartial judgment so that if it seems necessary to offer criticisms pertaining to the man or work being observed, these criticisms will be of a constructive nature. The man who is being observed should be one who is thoroughly familiar with the work in hand and both able and willing to do the work in a skillful manner and according to instruction.

PREPARING FOR A TIME STUDY

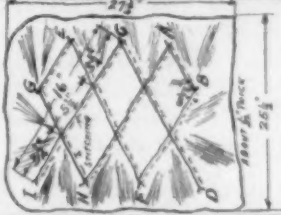
Before making a study, the observer should familiarize himself with the work to be studied, and the man to be observed should be acquainted with the reasons for taking the study. It frequently has been found advisable to pay the workman a higher wage than ordinarily, while he is co-operating with the observer. If this condition is fulfilled, the time study man and the operator will work in harmony, and the final accomplishment will be valuable.

To facilitate the making of a time study an "Observation sheet" similar to that shown is used. Provision is made on this for recording the observer's name, the operator's name and qualifica-

tions, the date and place of the study, and the description of the work. The sheet is so ruled that the elementary operations may be listed and the several complete observations separated.

The sample sheet shown herewith provides space for 20 observations. The actual number of observations which should be made will vary according to the nature of the work. If the elementary operations require a reasonably long time and the work is being done at a uniform rate, a few complete observations will suffice. On the other hand, if the elementary operations are very short and from any cause successive pieces are not produced at a uniform rate, a great many observations may be required. In fact, there are cases where the elements are so short that mathematical devices have to be resorted to in order accurately to obtain the results. In the above a "complete observation" is understood to be the cycle of events from the beginning of the job until the work is completed. An elementary operation is understood to be a single event in the cycle which forms the complete operation.

The time study man uses a board designed to hold both the observation sheets and the stop watch while making a study. For convenience, the dial of the watch is graduated to read in minutes and

DEPARTMENT	INSTRUCTION CARD		MATERIAL	MACHINE	LOCATION	DRAWING NO.
DISM			Leather	MACH. 4XE	DISM	20204
			FRONT CUSHION TOP NAME OR SYMBOL OF PIECE			
			Stitch Pleats			
			OPERATION			
			9.00 Min.			
			3.60 Min.			
DETAIL INSTRUCTIONS						RELATION TION
1	Change card at window					2.00
2	Return to work					.50
3	Get stock from rack					1.00
4	Prepare bobbins & re-thread needles (0.0017 per inch of stitching X96 1/2")					
5	Land top on machine & start at "A"					.16
6	Stitch from A to B					.15
7	Move top over & start at "C"					.07
8	Stitch from C to D					.12
9	Move top over & start at "E"					.23
10	Stitch from E to F					.12
11	Move top over & start at "G"					.23
12	Stitch from G to H					.11
13	Partly turn top & start at E					.14
14	Stitch from E to G					.19
15	Move top over & start at "C"					.07
16	Stitch from C to I					.15
17	Move top over & start at A					.22
18	Stitch from A to H					.18
19	Move top over & start at B					.22
20	Stitch from B to F					.17
21	Remove & land top on pile					.14
22	Remove stock to rack (Finished Rack)					.12
23	Get card signed					1.00
24	Take to window					2.00
					.50	
					7.00	
Allowance on Fatigue --					2.00	
Preparation --					9.00	
					3.79	
Allowance for Fatigue--					.81	
Time per piece ----					3.60	
WHEN WORK CANNOT BE DONE AS SHOWN, REPORT MUST AT ONCE BE MADE TO MAN WHO SIGNED THIS CARD.						
DATE 1/22/15						
SIGNED BY D.V. MERRICK						

Example of Instruction Card Built Up from Time Study Observations

hundredths of a minute, and the watch is so constructed that the hands may be stopped and started without setting them back to zero. The observer records at the completion of each elementary operation the total time which has elapsed since the beginning of the complete operation. This is known as taking "continuous time."

#### ANALYZING A TIME STUDY

Continuous time may be illustrated by the following example from a study taken on the cutting of cloth to the shape required for the making of a "front side curtain" for an automobile.

*Time Study of a Single Cycle of Operations*

	Elementary operation	Continuous Elementary time	
		in minutes	in minutes
1	Pull cloth on table and tear strip off..	0.42	0.42
2	Lay template on cloth.....	0.60	0.18
3	Cut cloth .....	0.71	0.11
4	Move template over .....	0.85	0.14
5	Cut cloth .....	0.96	0.11
6	Move template over .....	1.11	0.15
7	Cut cloth .....	1.22	0.11
8	Pile three sheets on pile and straighten	1.87	0.65

From this it is seen that the time for one complete operation is 1.87 min. The first element required 0.42 min. The second element, together with the first, required 0.60 min. By subtracting the first time from the second, the time for the second element, 0.18 min., is obtained.

In analyzing a time study, this operation is technically known as taking differences, thus obtaining what is known as a series of elementary times. The time for each elementary operation is obtained by subtracting the successive continuous times one from the other.

When the taking of a set of studies has been finished, if they are deemed satisfactory by those directing the time study work, the first thing necessary is to have the differences indicated on the observation sheets, an example of which is shown herewith. The differences are shown in small figure between the continuous times. The time study is now ready for analysis, which should be made by one man, or a group of men having the necessary education and training for such work. These men should be under the supervision of a man well versed in time study work.

Since time studies are taken in such detail, it is comparatively easy for the man who is analyzing one to comprehend the nature of the work which has been studied. Therefore, he at once begins to read over the description of the different elementary operations and tries to class together for the sake of comparison those operations which are of a similar nature.

#### ASCERTAINING FINAL VALUES

While a certain amount of judgment must be used in the selection of the final elementary times, a rule has been established for these selections, which, if followed, allows of choosing with considerable certainty and uniformity the proper values. This method consists of taking the average time value for an elementary operation or of elementary operations of the same kind after eliminating the unusually high or low values, and finding by what percentage this is higher than the minimum time value of that elementary operation.

For example, the first elementary operation on the study shown has values as follows: 0.21, 0.17, 0.19, 0.18, 0.26, 0.17, 0.18, 0.14, 0.20, 0.18. It will be noted that the value 0.26, which is excessively high, has been stricken out. The average value of the remaining nine values is 0.18 min. The minimum time is 0.14; and this average, 0.18 min., is  $28\frac{1}{2}$  per cent. higher than 0.14 min. As stated before, this percentage value is in a like manner

determined for each elementary operation. These percentages are then totaled and their average taken. This average percentage is then applied to the average of each of the elementary times obtained as above described, to reduce them to the standard time from which tasks are set. For example, the final value chosen is seen to be 0.15 min., which is the nearest even value of 0.18 min., reduced by the average percentage which was determined to be 19.

#### DRAWING UP INSTRUCTION CARD

A determination of the time having been made for each elementary operation, the time study may be considered complete, and the next step is to transcribe the information shown by it, together with any other information necessary, to what is known as an instruction card. Examining the instruction card shown, it is seen that this card has at the top the necessary detailed description of the part to which it pertains. Also there is shown the operation and a summary of the so-called preparation time, and the time per piece. Below are listed detailed instructions for the performance of the elementary operations, and there is shown in detail the method of obtaining the lump sum for the preparation time and time per piece.

Reading the detailed instructions, we note that  $2\frac{1}{2}$  min. are allowed for the workman to get the job card for the work he is to do, items 1 and 2, and  $2\frac{1}{2}$  min. more to return it after the lot is finished, items 23 and 24. Then 2 min. more are allowed in which to get stock to be worked upon and to place in the rack for finished pieces his finished work when the lot is completed, items 3 and 22. This makes a total of 7 min. to which 2 min. or approximately 30 per cent., is added for fatigue, making the 9 min. preparation time shown. All these values are based on standard times which have been previously established, for the particular plant where this card is used.

Referring now to item 4 in the detailed instructions, we read "Prepare bobbins and re-thread needles (0.0017 per inch of stitching  $\times$   $96\frac{1}{2}$  in.) = 0.16 min. As has been noted by the instruction card, the particular work being done is the stitching of plaits for "Front Cushion Top" and the work is to be done on machine "4XE," which symbol indicates a specific sewing machine in the department. The time study which had been previously taken and analyzed showed that for every inch of stitching done, an allowance of 0.0017 min. is necessary for preparing and re-threading the bobbins used on the sewing machine. This item illustrates the method of using established and tabulated standard data in setting times on work. The rest of the detailed instructions are a duplication of the elementary operations and time values shown on the original time study sheet.

As will be noted, a fatigue allowance has also been added to the sum total of these times. Where work is done on machine tools, an allowance is made on the sum total of all machine times, to take care of variations in motive power employed, and an additional allowance for fatigue is made for the so-called handling times.

#### MAKING ALLOWANCES FOR FATIGUE

The question of what allowances to make for fatigue varies with the nature of the work being done and with the means for doing it. Occasionally it is necessary to make special studies extending over a considerable period of time with a view to compiling data to be tabulated in such a way as to give conveniently and accurately these allow-

ances. In some cases, these data may be reduced to mathematical formulæ. Some years ago, Mr. Barth deduced such a formula for use in connection with handling time allowances on machine tools.

The reason advanced for selecting these time values which are nearer to the minimum values than to the average, is that they represent the best work of the man. A little reflection will make clear the fact that a workman's best performance is better than his average performance. Also actual studies show that, more frequently than not, the minimum time is accomplished more than once. Further, studies of the same work made on different operators frequently show the accomplishment of the same minimum time and yet these studies do not show the same average time.

The percentage of difference between the average and the minimum values obtained for each elementary operation in a given time study may be termed the "standard deviation" for that study. Selecting the standard time elements as herein described and by the aid of the standard deviation renders it unnecessary to make all the studies for a given job on one man, and also gives a more uniform set of elements on which to base fatigue allowances.

Analysis of the results accomplished after time studies have been made and put into effect, shows that operators of the average ability will accomplish their work with but a small percentage of variation in the time allowed, providing that they have been properly instructed, and the necessary and advisable facilities placed at their disposal.

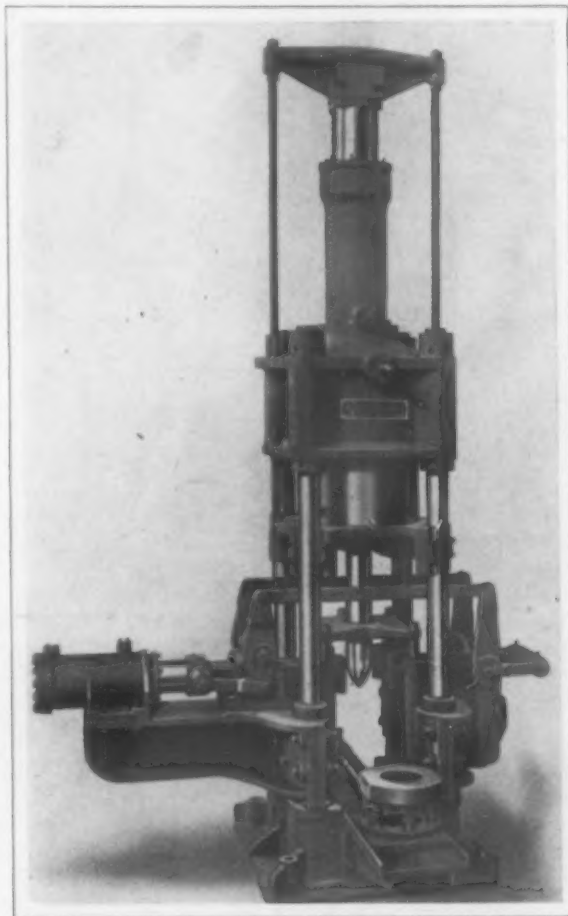
Almost always there is the exceptional workman who on some given work will, because of peculiar ability for that particular work, accomplish the work in a considerably less time than the average workman. No attention should be paid to such a workman, however, other than to let him profit by his peculiar ability.

### Permanent Magnet Steel

In a paper before the Institution of Automobile Engineers (England) on "Permanent Magnet Steel," J. F. Henderson said that, while it usually contains tungsten, the process of hardening it is one that requires great knowledge and care, the magnets being always very hard but not necessarily glass hard. If a long and short magnet are made of the same steel, the short one must be rather harder than the long one to get the best results out of each. The two qualities required in a magnet are high magnetization and permanence. The great bulk are small and for scientific instruments but must possess as nearly absolute permanency as possible and need not be very strong. Magnets for a magneto, however, are large and therefore more difficult to harden uniformly. They must be as powerful as possible and reasonably permanent. Magnets never remain permanently as strong as when they were newly magnetized. A usual and good practice is to lay them aside on a rack for a fortnight before they are tested. It has been found that by that time they have come down to a sufficiently permanent state. A good magnet should give about 200 lines per cubic centimeter. Thus a magnet 32.4 x 4.5 x 1 c. m. gave a total flux of 930,000 lines. The addition of tungsten to steel increases the electrical resistance less than any other material, says Sir Robert Hatfield. Previous to the war the magnet and magneto industry was controlled by Germany, due, says Mr. Henderson, to that country's greater push. He had had great difficulty in getting magnet steel in England, and had used first of all four magnets 10-in. long by ½-in. thick and 2-in. wide which he had to get from Germany. Good permanent magnet steel can now, however, be obtained in England.

### Hydraulic Billet Piercing Press

A special billet piercing press, in which hydraulic power is used to pull the billet into place and to center it, has been completed by R. D. Wood & Co., 400 Chestnut street, Philadelphia, Pa. Although the press is intended for piercing steel



A 200-Ton Hydraulic Vertical Block Punch for Piercing Steel Bars, Brass, Copper and Other Materials. After Being Placed in the Die, the Billet Is Pulled into Position and Centered by a Hydraulic Cylinder

bars, it can also be used for brass, copper and other materials.

The machine is designated by the builder as a 200-ton hydraulic vertical block punch, and will pierce holes ranging from 2 to 7 in. in diameter and from 2 to 9 in. in depth, where the temperature of the material worked is approximately 2000 deg. F. Billets ranging from 11 to 15 in. in diameter, and from 6 to 24 in. in length can be handled. The billet to be pierced is first dropped in the die and is then pulled into place by a hydraulic cylinder. This cylinder also centers the billet, after which the piercing operation is performed.

The Pacific Iron & Steel Company, Tacoma, Wash., which operates an electric furnace, has consolidated with a new local corporation, known as the Puget Sound Electro Manganese Company. The new company plans to construct a power station, with 100,000 hp. capacity, enlarging the present plant, and to erect another smelter near its mines at Hood River. A. J. Cole is president of the new organization and W. H. Rowe is secretary.

The Erdle Perforating Company, manufacturer of perforated sheet metals, Rochester, N. Y., has moved from its former location at Mill and Factory streets, to a new fireproof building, at York street and the Buffalo, Rochester & Pittsburgh Railway.



## Leather Belts at Panama Exposition

What can be done with leather belting in the way of somewhat unusual drives is brought out in the exhibit which the Charles A. Schieren Company, 37 Ferry street, New York City, is making



A Collection of Unusual Drives with Leather Belting. The Power Is Furnished by a Motor Mounted on One of the Rear Columns

at the Panama-Pacific International Exposition. Here there are a number of vertical, horizontal and quarter-turn drives, the power being transmitted through shafting, friction clutches, tight and loose pulleys, countershafts and Lenix drives, from a single electric motor to a variety of machines. A view of the booth in which the exhibit is held is presented in the accompanying halftone, while the line drawing shows the arrangement of the driven machinery, and the belts and pulleys by which the power is transmitted.

The driving motor, which is a 5.4-hp. three-phase unit, is located on the side of one of the columns and operates at a speed of 1440 r.p.m. Through a Lenix it drives shaft No. 1 at a speed of 360 r.p.m. An overhanging pulley at the front end of this shaft transmits power to a sugar centrifugal machine at a speed of 1080 r.p.m., the belt passing over two guide pulleys, so that the pulley on the end of the shaft and that driving the machine are located in planes approximately at right angles to each other and the center line of the shaft intersects the center line of the machine at an angle of 135 deg. A belt, running over a fixed idler and a Lenix, drives shaft No. 2, on the opposite side of the booth at a speed of 180 r.p.m. At the front end of this shaft a Bamag countershaft with two pulleys will drive a planing machine at a speed of 1200 r.p.m. When the photograph of the exhibit was taken, the planing machine, which also has a Lenix, was not installed. At the other end of this shaft a quarter-turn belt arrangement is provided to drive shaft No. 3 at a speed of 60 r.p.m., the guide pulleys being located on the base of the column, as shown. A set of tight and loose pulleys located near the rear end of this shaft transmits power to a centrifugal pump which supplies the fountain shown in the water basin, the speed of the pulley driving the pump being approximately 1000 r.p.m.

On shaft No. 3 a friction clutch is located, and a belt running over mule pulleys drives a short vertical shaft to the left of the column on which the driving motor is mounted. This shaft operates at a speed of 60 r.p.m., and mounted on it is a smaller pulley which, through a Lenix, drives the large pulley located under the roof of the booth at the center. This pulley is mounted on the vertical shaft extending down into the center of the water basin and operates at a speed of 3 r.p.m. At the lower end there is a Lenix drive of Duxbak belting which runs permanently in the water. A duck, emblematic of the company's trademark, is fastened to the belt and swims around in the basin, making a sudden swerve when the Lenix is passed. At the far end of shaft No. 3 a cement tube mill grinding machine is driven at a speed of 60 r.p.m., through a countershaft, running at three times that rate.

The roof of the booth supports a belt arranged in the form of a spiral bearing the firm name and its trade mark. At night the belt is illuminated by

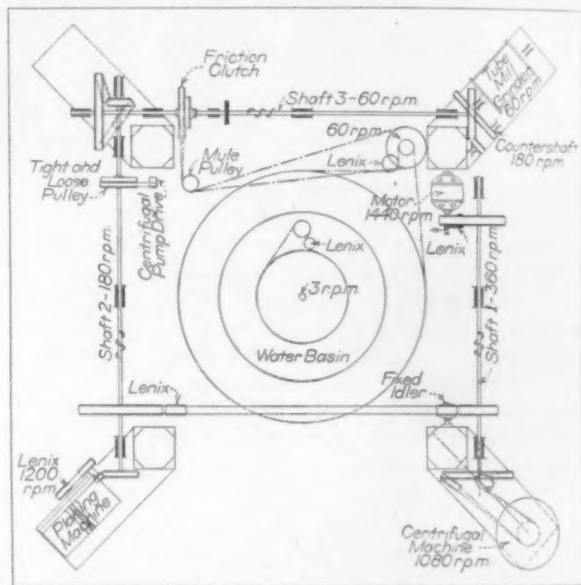


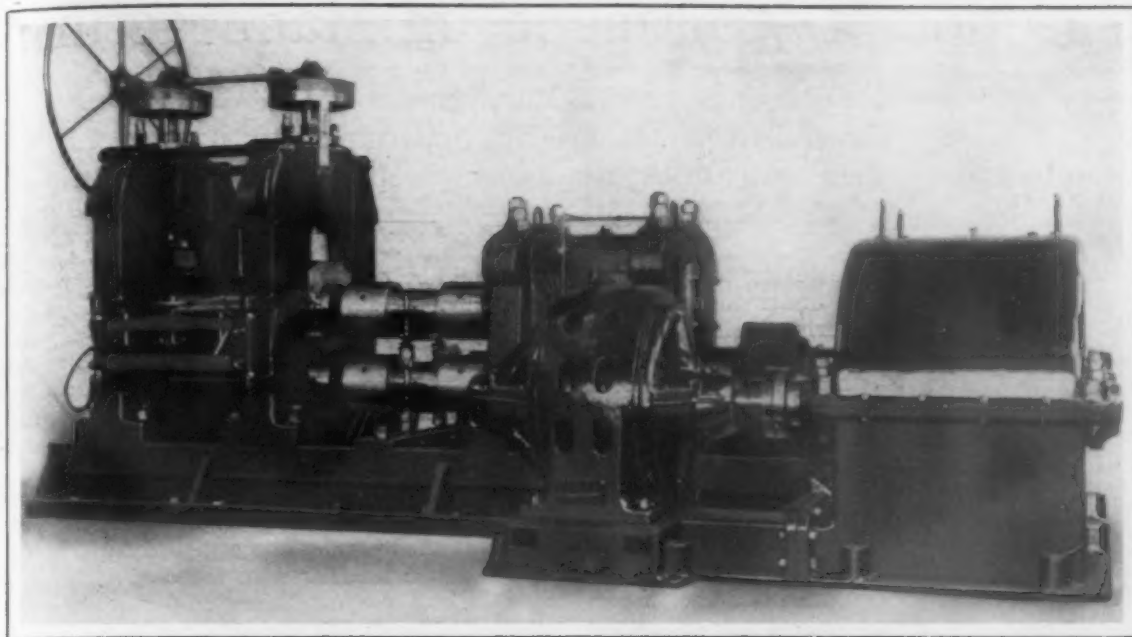
Diagram Showing the Arrangement of the Shafts and the Belts

a number of concealed lamps, and a number of others are located on the columns and the ceiling of the booth.

## New Design of Cold-Rolling Mills

Two cold-rolling mills, one 20 in. in diameter, and the other a 12-in. mill, have been designed and built by the United Engineering & Foundry Company, Pittsburgh, Pa., at its Youngstown, Ohio, plant. These mills are intended for the production of cold strip material, the larger being designed especially for rolling aluminum, while the other, although intended for the cold rolling of steel, can be used with slight changes for handling all the soft metals. The special feature which is common to both mills is the compact driving arrangement, while the smaller one possesses a device for aligning the rolls which can be adjusted while the work is between them.

The 20-in. mill, which is the one shown, will handle aluminum in widths up to 30 in. The driving unit of the mill consists of an oil-tight housing in which gears of the double helical type operate in an oil bath. This drive is connected to the mill pinions through an Oldham coupling, the pinions also being inclosed and provided with flood



A 20-In. Cold-Rolling Mill for Aluminum with a Compact Arrangement of Driving Gears

lubrication. With a view to minimizing back lash, the coupling boxes and the spindles are entirely machine finished, and it is pointed out that the arrangement of the screw-down provides for accurate alignment of the rolls at all times. If desired, adjustments as fine as 0.001 in. can be secured by index heads which are provided on the screws.

The roll aligning device on the 12-in. mill can be adjusted while the work is between the rolls, a feature upon which special emphasis is laid. A new design of reel is used in connection with the mill. It is expanded by the same treadle motion as that which starts the mill in operation and is contracted by inserting a bar in a capstan head on the reel drum.

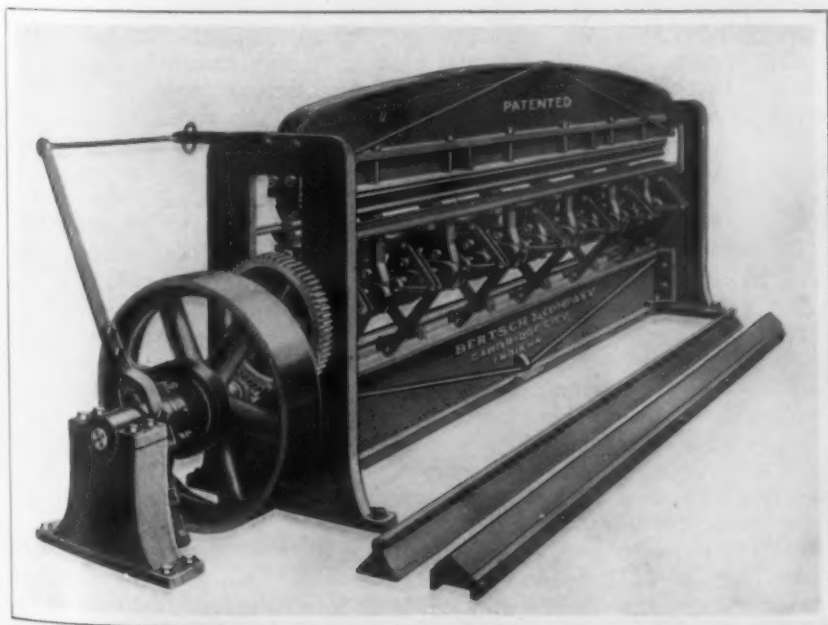
These mills were designed to take the place of those furnished heretofore by German manufacturers, and both of them were recently tested at the works in the presence of a number of leading officials of various companies interested in the cold rolling of steel, copper, brass, aluminum, zinc, etc. In testing the 12-in. mill, it was found that a strip of steel 6 in. wide could be curved in either direc-

tion or run out straight, at the will of the operator, and the operation of the mill was also carried to a point where a piece of steel was started through the mill, curved to the right, then in the opposite direction and finally delivered straight in a single pass. This mill was only clamped to the floor, but was able, nevertheless, to reduce a strip 6 in. in thickness to the same extent as was done in ordinary operation where the mill is bolted in place. The test of the machines was made under the supervision of Mr. Reed, superintendent of the Morris & Bailey Steel Company, Pittsburgh, who also furnished a strip mill roller for the occasion. They had not seen the mill prior to the day of the test, and the rolls had only been turned over for the first time about 1 hr. before the test.

### Ridge Roll and Coping Forming Machine

Bertsch & Co., Cambridge City, Ind., have brought out a new type of sheet metal forming machine. It is designed for making ridge roll and coping of both the common and various special designs, valleys, single and ogee moldings and eaves trough. For handling the several classes of work various forms of dies are employed, two of which are shown in the foreground of the accompanying illustration.

The general design and principle of operation employed in the machine are both brought out in the accompanying engraving. As will be noticed a number of toggle joints are employed, the function of these being to deliver pressure against the side forming dies. The general construction of the machine follows that of the builder's standard line. In regular operation approximately 50,000 ft. of finished product have been turned out and nested by a single operator, and but one helper in a 10-hr. day.



A Recently Developed Machine for Forming Ridge Roll and Coping from Sheet Metal

# Inspection Department in Manufacturing

## Its Relation to the Management of the General Organization—Not Subordinate to the Factory or the Engineering Department

BY FRED B. COREY

In the majority of manufacturing corporations, the inspection department is under the authority of the factory manager or superintendent. In other words, that branch of the organization which builds the apparatus decides whether that apparatus is properly built. It is unnecessary to point out the inherent weakness of this arrangement. The judgment of the inspector may continually be biased by the fact that he is a part of the factory organization and is responsible to the factory management. It is, therefore, evident that the highest standards of quality and workmanship hardly can be maintained continuously if the members of the inspection department are in any degree subject to the control of a factory superintendent or any other executive who is directly responsible for the factory production and has no connection with the engineering or sales organizations. This statement should not be understood as expressing a doubt in regard to the loyalty or honesty of purpose of any factory official. We must recognize the fact, however, that defects, due to drawings or specifications, are often disregarded by inspectors if they know that no criticism can attach to their superiors on account of their approval of the apparatus, especially when a rejection would prevent meeting a promised date of delivery.

In a smaller number of manufactories, the inspection department is under control of the chief engineer. With this arrangement, the judgment of the inspector is likely to be biased by the fact that any defects in the finished product, due to improper specification of materials or any failure of the apparatus to function properly, might be considered as reflecting on the abilities of the engineering department. The inspector will often hesitate to reject a device if he thinks that the objectionable feature may be attributable to his superior officer, as it would imply a difference of opinion that might reflect discredit on the inspector's judgment. Moreover, there is often a tendency among young and subordinate engineers to refuse to recognize slight defects in a design for which they are personally responsible, and to criticise severely an inspector who points out what he considers may be a defect in such apparatus or holds material on account of insufficient engineering data for its proper inspection. Therefore, it will be seen that in most cases the executive head of the inspection department should be free from control of the engineering department as from the manufacturing department.

### INSPECTORS RESPONSIBLE TO CHIEF EXECUTIVE

The only logical plan of organization is that in which the head of the inspection department, whatever may be his title, is responsible directly to the general manager of the company or the chief executive in control of the factory output. He should report to the same officer as does the works manager or the chief engineer. At the same time, he must be in full sympathy with all other departments. He must command the respect of the other department

heads and be ready always to co-operate with them to further the interests of his company.

The executive head of the inspection department should be thoroughly familiar with general engineering practice and standards. He should be well informed in all shop methods, including foundry and machine shop practice, and be thoroughly versed in the use of testing machines and gauges. He should, if possible, be conversant with chemical laboratory methods and apparatus, so as to be able intelligently to direct that part of his organization. Moreover, he should be familiar with the uses of the factory product and the conditions under which it is to operate after it has passed beyond control of the factory. He must have absolute control of every inspector in the plant and be held responsible for the quality of material and workmanship of all that the plant produces.

### DEALING WITH COMPLAINTS OF CUSTOMERS

In the majority of manufacturing corporations, all dealings with the customers are conducted by the sales department exclusively, which is the logical arrangement. For this reason, complaints, on the part of the customer, are made directly to the sales department and usually reach the shop through a more or less tortuous channel. There is sometimes a tendency on the part of the sales department to assume that all of these complaints are justified, to criticise the shop for turning out an unsatisfactory product and especially to blame the inspection department for failure to prevent the issuance of the material to which the complaints refer.

In justice to all concerned, including the sales department, all such complaints should be referred to the executive head of the inspection department for a personal investigation and report, and action on the part of the sales department, except so far as it relates to the replacement of material urgently needed, should be deferred until the report is in hand. This report may entirely change the attitude of the customer with relation to the alleged defective material, as it may clearly show that its failure to meet his expectations was due to no fault of the manufacturer or of the apparatus involved. The trouble may have been due to injury in shipment, rough handling after receipt, failure to install or to apply it properly, lack of proper maintenance on the part of the customer or his employees or to a misconception of the capacity or functions of the apparatus itself. Any errors on the part of the factory or inspection department must be freely acknowledged and any steps to prevent their recurrence should be fully explained. An unbiased report, based on all available facts, rendered by the head of the inspection department to the head of the sales department, may be invaluable to the salesman in his negotiations with the customer.

### SALESMEN SHOULD UNDERSTAND INSPECTION WORK

The inspection department is for the mutual protection of the manufacturer and the customer. The salesmen should be informed in regard to the methods and practice of the inspection department, as this knowledge may be of great service in promot-

\*From a paper presented before Section D of the American Association for the Advancement of Science at the Philadelphia meeting, December 30-31, 1914. The author is a consulting engineer, Pittsburgh, Pa.



ing friendly relations with a prospective or actual customer. The customer is often much interested in the means employed to insure accuracy in the manufacture of the apparatus he proposes to use. The head of the inspection department should therefore make it his duty to advise the sales department of any change in procedure or equipment that might be of interest to that department in their dealings.

The relations of the inspection department to the engineering department are most important, especially in the influence that may be exerted on the designs for new apparatus and the improvement of the old. In many places, new drawings, when completed and before their final approval, are submitted to a committee (variously known as "mechanical design committee," "limit committee," "standard committee," etc.) to determine if the limits set by the designers are such as can be met commercially in the factory, and to decide if any changes are desirable on account of methods to be used in the foundry, machine shop or elsewhere. The head of the inspection department should be one of the most important members of this committee; in some instances he is ex-officio chairman. His principal duty in connection with this committee is to advise if the dimensions, tolerances and limits, called for on the drawings, are satisfactory for the various fits and if the quality of finish called for will be satisfactory to the inspection department. Thus, the work of the inspection department should begin even before the designs are approved for manufacture.

### A 26-In. Open-Side Planing Machine

A new 26-in. open-side planing machine designed to handle a large variety of work and particularly for use in the toolroom and in the smaller jobbing machine shops, has been brought out by the Cleveland Planer Works, Cleveland, Ohio. This machine is an addition to the company's line of open-side planing machines, ranging in size from 30 to 72 in. and is generally similar to the other sizes. The machine is rigid in construction and simple in design, having all the movements required, with few working parts.

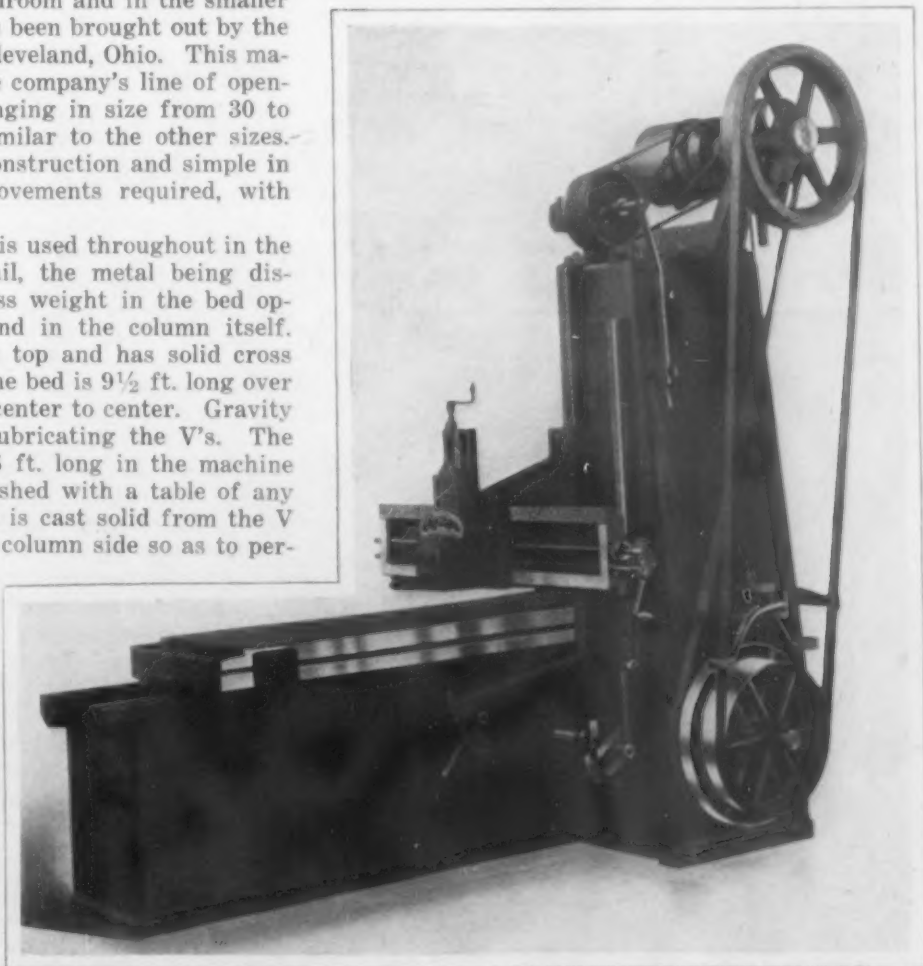
The box section design is used throughout in the bed, column and cross rail, the metal being distributed to place the excess weight in the bed opposite the column base and in the column itself. The bed is cast closed on top and has solid cross ribs at short intervals. The bed is 9½ ft. long over all and the V's are 15 in. center to center. Gravity oil feed is provided for lubricating the V's. The table is 24 in. wide and 6 ft. long in the machine illustrated, but it is furnished with a table of any length desired. The table is cast solid from the V over to the column on the column side so as to permit the handling of a large amount of overhanging work without the use of a supplemental rolling table. It is provided with three T-slots cut from the solid and holes at frequent intervals not bored through. The column is cast integral with the bed up to the table level, the upper section being bolted and dowelled to the lower, resting on heavy broad flanges. The knee is bolted to the

column and is raised and lowered by power after loosening the bolts. It has a broad bearing of 22 in. on the column. The cross rail which is bolted and dowelled to the knee is 52 in. long. A taper gibbed head on the cross rail can be operated from either side of the machine. When desired the machine is also furnished with a side head on the column. The head has hand feeds and power feeds of the friction type in all directions.

The drive is of the spur and bevel gear type through a belt from the countershaft, which is mounted on the top of the column. The drive can be set parallel with or at right angles to the head. All the gears in the drive, except the box gear and its pinion, are inclosed and run in oil. A motor drive can be provided if desired. The machine has a cutting speed of 30 to 50 ft. and a return speed ratio of 3 to 1. All shafts can be removed from the side of the bed without disturbing the alignment of the column or cross rail. All small part castings are of semi-steel, the bed, table, column and knee being the only parts of gray iron.

The machine occupies a floor space of 70 in. in width and 114 in. in length exclusive of table travel and is 83 in. high. It weighs 9000 lb.

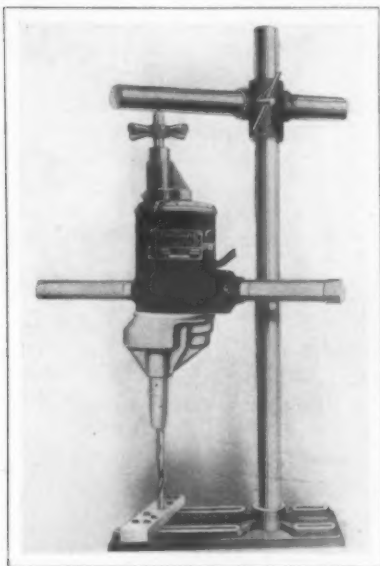
The Valley Iron Works, Williamsport, Pa., manufacturer of steam engines and transmission equipment, has moved its New York offices from 90 West street, to 30 Church street, room 707. The company has severed its connection with the A. D. Granger Company, which had charge of the sale of its engines, and the entire line, including the Lycoming engine, will be handled by W. H. Mills, New York manager for the Valley Iron Works. Mr. Mills has been with the company a number of years.



A 26-In. Open-Side Planing Machine for Use in Toolrooms and Small Jobbing Machine Shops

## New Stand for Portable Electric Drills

For use by structural iron workers or in any place where a lot of heavy drilling is to be done with portable electric tools, the Standard Electric



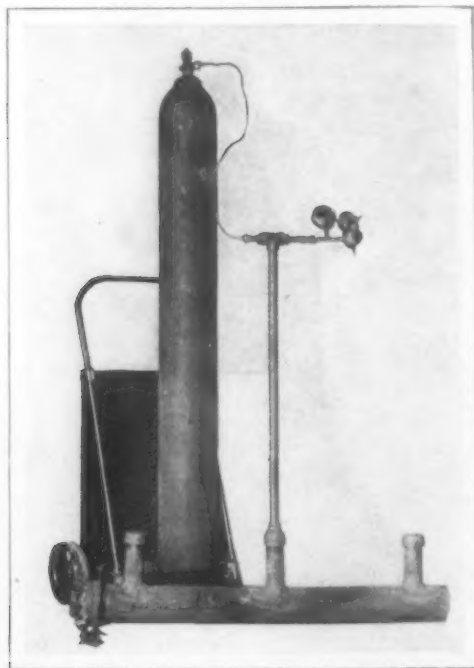
A Stand or "Old Man" That Has Been Developed to Enable Heavy Drilling To Be Done with a Portable Electric Drill

stand are 60 and 75 lb., respectively.

As will be noticed from the accompanying illustration, the stand can be clamped in place by bolts and slots in the base, and the end thrust is taken by the horizontal member at the top of the stand, while the cross bar on the body of the drill bears against the vertical member of the stand and keeps the drill from turning. These drills, which were illustrated in *The Iron Age*, January 9, and July 3, 1913, are equipped with universal motors, so as to be capable of operation on either direct or alternating current, and ball bearings are used throughout.

## Testing Autogenously Welded Headers

A simple method of testing joints made by the autogenous welding process was devised by the Bird-Wilcox Company, Atlanta, Ga. This test was



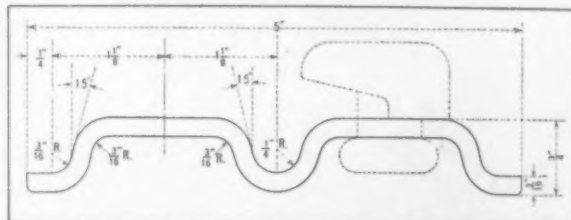
Testing the Joint of an Ammonia Header That Was Made by Autogenous Welding

made in connection with a number of ammonia headers that were made in the company's shop for an ice plant.

The test caps were placed on the open ends of the header and on the outlets, with the exception of the central one. The header was filled with water and a piece of 1-in. pipe, 3 ft. long, was attached to a reducer which was placed on the center outlet. At the top of this pipe a T was placed, on one side of which was a set of gauges, and on the other side connection was made with a high-pressure oxygen cylinder. The supply of oxygen was turned on, thus enabling the header to be tested up to a maximum pressure of 2000 lb. per sq. in.

## Heavy Industrial Railroad Steel Tie

For use on industrial railroads and in mines where rails weighing from 40 to 60 lb. per yd. are laid, the Cambria Steel Company, Morris Building, Philadelphia, Pa., has brought out a heavy type of steel tie. In general construction this tie is the same as the one illustrated in *The Iron Age*, July 2, 1914, except that it is wider and is made of slightly heavier material. The particular features claimed for these ties are that the rail fastenings are always in place and cannot be lost,



Drawing (Half Size) of a Steel Tie for Use on Industrial Railroads with Rails Weighing from 40 to 60 Lb. per Yd.

the track can be assembled easily and cheaply, the tie is light and portable and has a long life, the track gives a maximum amount of headroom where the height is restricted and also enables the track to be extended or shifted readily.

The ties, which are rolled steel sections, are made for various gauges, the principal ones being 36 and 45 in. Two styles of ties, one for supporting the rails between joints and the other which is designed to be placed under the rails where the joints occur, are made. Buttons that are riveted in place are employed as rail fastenings and can be turned by an ordinary long-handled wrench easily. They are fastened to the tie in such a way that the friction of the rivet holding them is relied upon to keep them in any position to which they may be turned. This arrangement can be supplemented by the use of washers under the rivet heads. These washers may be either flat or slightly concave and with the latter type of washer a certain kind of spring action that provides a turning friction for the fastenings and also enables the button to be turned without twisting off the shank of the rivet is secured. On the ordinary ties but four clips are used, while in the joint type this number is doubled, thus giving two clips for each end of each rail. With this arrangement the rails may be set end to end on the tie and made fast by the buttons, no fishplates or other rail splices being required.

At the annual meeting of the Pan-American Bridge Company, Newcastle, Ind., the following officers were elected: President, Harry E. Jennings; vice-president, R. D. Goodwin; secretary-treasurer, H. C. Yauky; general manager, Jesse D. Smith. A 6 per cent. dividend was declared on the preferred stock.

## PENNSYLVANIA'S 125-LB. RAIL

## Comparison of This With the Railroad's Present 100-Lb. Rail

An important question occupying the attention of the railroads at present is the possible necessity and economy of using considerably heavier rails, especially on lines where traffic is heavy. The 100-lb. rail has for some time been the standard, but recently the Pennsylvania Railroad decided upon trials of a heavier one and made arrangements for the manufacture of a 120-lb. rail. Soon after these plans were considerably advanced this company decided to make trials of a 125-lb. rail instead of the 120-lb. one, the change being necessitated by the desire to have a rail which would have a moment of inertia of approximately 70. The 125-lb. rail approximates this aim nearer than the 120-lb. rail, being 68.7 against 59.20.

This new 125-lb. rail is of course experimental in character and various steel companies are now rolling small orders in accordance also with new as well as old specifications, the finished rails to be thoroughly tried out in service. A comparison of the new 125-lb. rail with the 100-lb. section at present in use by this railroad is presented in the accompanying illustration.

The height of the new rail is  $6\frac{1}{2}$ -in. against 5-11-16 in. in the 100-lb. section; the width of the base is  $5\frac{1}{2}$  in. compared with 5 in. The top of the head had a radius of 12 in.; instead of one of 10 in. in the 100-lb. rail and the corner radii 7-16 in. in each case. The fishing angles are 18 deg. for the head and 14 deg. for the base, compared with 15 deg. and 13 deg. respectively for the older rail. These and other dimensions of the new abandoned 120-lb. rail are quite different for the proposed new rail. For convenient comparison the various principal dimensions of the new 125-lb. rail, the 120-lb. new abandoned one and the present 100-lb. section are given in the table.

The 110-lb. rail of the Lehigh Valley Railroad is the nearest approach to this new 125-lb. section. Its height is 6 in. with a 10-in. top radius.

Table Showing Comparative Data of the 125-lb., 120-lb., and 100-lb. Rails of the Pennsylvania Railroad

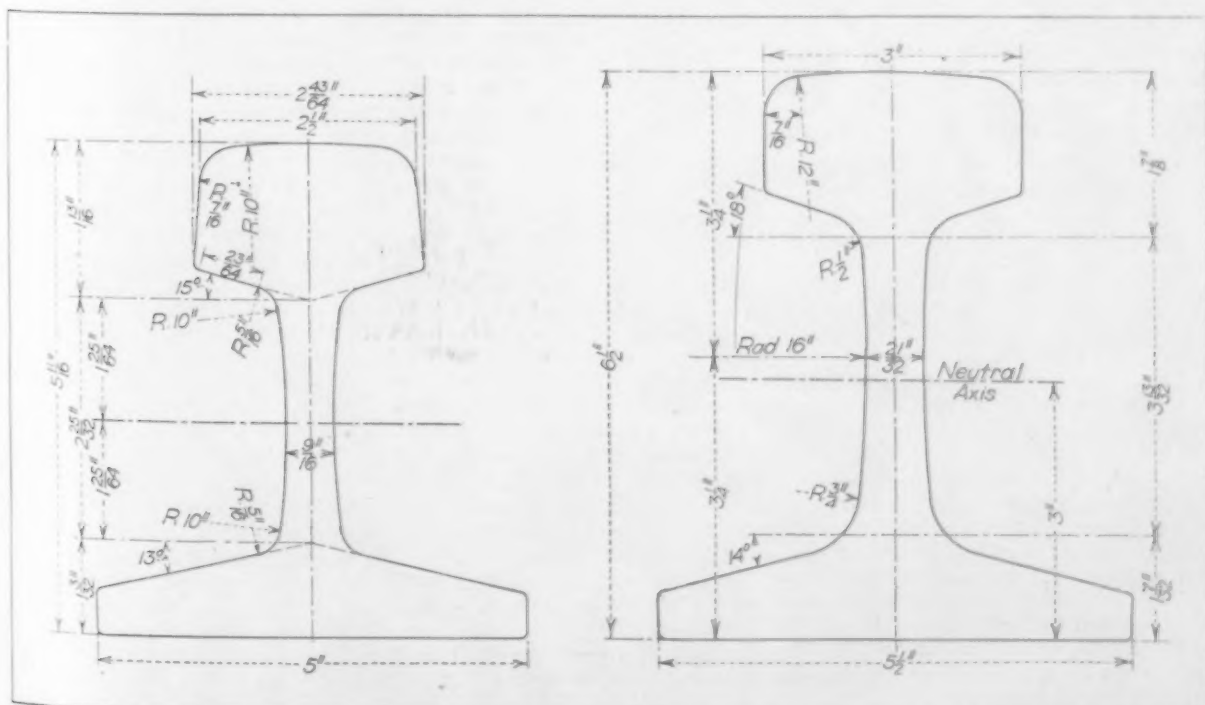
	125-lb. rail	120-lb. rail	100-lb. rail
Weight per yard, lb.	123.8	120	100
Height, in.	$6\frac{1}{2}$	$6\frac{1}{2}$	5-11/16
Width of base, in.	$5\frac{1}{2}$	$5\frac{1}{2}$	5
Width of head, top, in.	3	2-11/16	2-1/2
Width of head, base, in.	3	2-31/32	2-43/64
Depth of head, in.	1-7/32	1-3/16	1-13/16
Depth of web, in.	3-13/32	2-1/16	2-25/32
Depth of base, in.	1-7/32	1-3/16	1-3/32
Thickness of web, middle, in.	21/32	11/16	9/16
Radius of top of head, in.	12	10	10
Radius of top corners of head, in.	7/16	7/16	7/16
Radius of fillets, in.	1/2	1/2	5/16
Radius of sides of web, in.	16	18	10
Edge of base.	Vertical	Vertical	Vertical
Fishing angles, top, deg.	18	18	15
Fishing angles, bottom, deg.	14	14	13
Area of head, sq. in.	4.73	4.84	4.09
	(38.9%)	(41%)	(41%)
Area of web, sq. in.	2.47	2.60	1.85
	(20.3%)	(22%)	(18.6%)
Area of base, sq. in.	4.95	4.38	4.03
	(40.8%)	(37%)	(40.4%)
Area, total, sq. in.	12.15	11.82	9.97
	(100%)	(100%)	(100%)
Moment of inertia.	68.7	59.20	41.9
Section modulus, head.	19.6	17.77	13.71
Section modulus, base.	22.9	20.00	15.91

## France Suspends Duty on Rails

WASHINGTON, D. C., March 9, 1915.—In a cablegram from the American ambassador at Paris, under date of March 5 the announcement is made that by a decree of March 4 the French Government has suspended until further notice the import duties on rails and fish plates intended for the repair of lines of communication important for the national defense. To obtain the benefits of the exemption a certificate must be procured from the Office of Public Works. This exemption will be applicable to all shipments made hereafter and until the publication in the Journal Officiel of a decree providing for the reimposition of the duty. The rate of the general tariff on rails of iron or of carbon steel which is now paid by the American product is 79 cents per 100 lb., and on rails containing more than 9 per cent. of manganese \$1.31 per 100 lb. The rates of the minimum tariff, which are not enjoyed by American products, are 53 cents and 88 cents, respectively.

W. L. C.

Russia's exports of manganese ore for the first nine months of 1914 were 737,149 tons against 817,345 tons for the same period in 1913. Imports of coke were 512,000 tons to October 1, 1914, compared with 687,000 tons in the same period in 1913.



Section of the New 125-lb. Rail of the Pennsylvania Railroad (Right) and the Present 100-lb. (Left), Giving the Principal Dimensions.

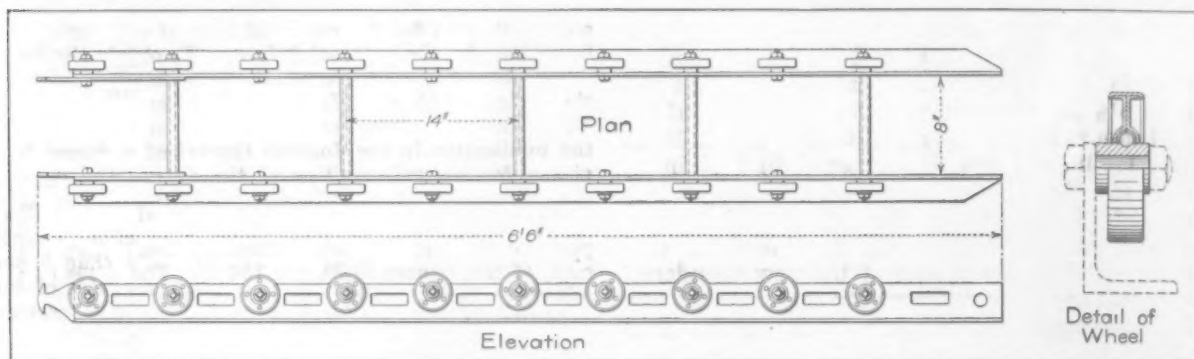


## A Combination Friction and Roller Skid

The Mathews Gravity Carrier Company, Ellwood City, Pa., has brought out a device that combines in one a friction and a roller skid. In addition to being used as a skid, it may also be used as a push or pull truck, or as a short ladder.

The skid, which weighs 73 lb., is constructed entirely of metal. The main framework consists of side rails, 6½ ft. long, of 2 x 3-in. angles, fastened together by cross members of 1½-in. cold-rolled shafting. These cross pieces are spaced 14 in. apart, the width between the rails being 8 in. and the over-all width 12 in. Ball bearing wheels, each of which is 3 in. in diameter with a ½-in. face, are located on the 3-in. leg of the angles forming the side rails, the space between centers being 7 in.

In unloading heavy boxes or barrels from trucks or wagons the device can be used as an ordinary friction skid, while by turning it over the wheels are placed uppermost, thus enabling heavy packages to be loaded quickly and easily. As will be noticed from the accompanying drawing, one end of the skid has heavy double pointed hooks, which are re-



Sketch Showing an Improved Form of Combination Friction and Roller Skid That Can Also Be Used as a Truck and Short Ladder. The Plan and Elevation Views Are Drawn to One-Quarter the Size of the Detail of the Wheel.

lied upon to furnish a safe fastening when the device is used either as a friction or a roller skid.

If the skid is laid on the floor with the wheel side down it can be used as a pull or push truck. The two center wheels are set slightly lower than the others, with a view to making it possible for the skid to be turned completely around within its own length. For reaching packages tiered up to a height of 10 or 12 ft. or articles stored on a high shelving, the skid can be used as a short ladder, the cross rods forming the rungs.

## Utilization of Exhaust Steam in a Shipyard

At the plant of the Newport News Shipbuilding & Dry Dock Company, Newport News, Va., a 1400-kw. De Laval low-pressure turbine, operating at 3000 r.p.m. drives two 700-kw. direct-current dynamos at 500 r. p. m. The turbine is of the pressure stage type and receives the exhaust from air compressors and hydraulic pumps, exhausting in turn into a surface condenser. In this installation the dynamos are mounted with their shafts parallel to each other, with the result that a compact arrangement of apparatus is secured and the pressures on the bearings and gear teeth are reduced. The normal yard load of approximately 1000 kw. at 220 volts is regularly carried by the turbine-driven generators, while when pumping out a drydock the combined load of approximately 2300 kw. is carried by connecting one of the original 600-kw. engine-driven generators in a series with the turbo-generator, thus supplying approximately 500 volts, for the two large motors in the dock pumphouse. In this way, it is pointed out, the economy of a turbo-generator set is secured for ordinary operation, and the existing engine-driven units are not discarded but are utilized as spares.

## Geological Survey at Panama Exposition

The exhibit of the United States Geological Survey at the Panama Exposition, San Francisco, occupies a space 62 x 78 ft. in the Palace of Mines and Metallurgy, flanked on one side by the exhibit of the Bureau of Mines and on another by the Alaskan exhibit, for which also the Survey has been in a measure responsible. The central feature of the exhibit is a booth, containing stagelike settings of a scene, partly modeled and partly painted. The first represents an undeveloped district in the arid West being studied by the Survey. The second scene shows the same district after development. Behind the scenes, in the same booth but facing the ends, are recessed screens, on one of which are shown pictures illustrating the different kinds of Survey work and the part they play in the development of the country. On the other screen are shown several series of pictures.

At one end of the space is shown the per capita production of minerals in the United States in 1880, about the time of the organization of the Survey, and in 1913, the period between these dates practically covering the past work of the United States Geological Survey. The exhibit consists of one 97-millionth of the actual production of each mineral in 1913 and one 48-millionth of the production in 1880.

The space along one of the outside aisles is devoted

to a series of cases, illustrating what our common things are made of, what the raw material looks like as it is obtained from the earth, and where it occurs in the United States. A map of the United States, showing where the ores occur, hangs over some of the articles. Most of these individual maps have been prepared especially for this exhibit. At the west end of the space is an exhibit of the power and fuel resources of the United States. In order to show the transparencies included in the exhibit to the best advantage, arcades resembling mine entrances have been built at the corners of the space.

One feature of the exhibit is the stereoscopic pictures, resembling the old mutoscope views but of a modernized type. These will be arranged in boxes of 50 each on a table at which one may sit and study leisurely various features of Survey work. There are also shown four series of pictures of the Grand Canyon and Rocky Mountain region, taken in the early days of the Geological Survey by the famous photographers, Jackson and Hillers. Other cases show the gem minerals, the rare mineral ores, etc.

The National Scrap Iron & Steel Association which at its annual meeting, held recently in Chicago, undertook, as a part of its 1915 programme, to establish an Eastern division, has appointed a committee consisting of W. K. Kenly, president, Merchants Steel & Supply Company; Fred Mayer, secretary, and D. R. Cohen, ex-president, of D. R. & F. A. Cohen, Chicago, to effect the organization of this division. The committee will meet at Philadelphia in the week beginning March 7.

The Carroll Foundry & Machine Company, Bucyrus, Ohio, has elected P. J. Carroll president and general manager; F. P. Donnenwirth, vice-president, and W. A. Blicke, secretary and treasurer.

## LACKAWANNA STEEL COMPANY

Report for 1914 Shows a Deficit of \$1,652,444.58  
After Usual Appropriations

The annual report of the Lackawanna Steel Company for the year ended December 31, 1914, makes the usual bad showing of industrial companies for that calamitous period. The income account of the company and its subsidiaries is given as follows:

Total net earnings after deducting all expenses, including ordinary repairs and maintenance, but not renewal expenditures and other appropriations for the current year.....	\$1,581,378.46
Deduct interest on bonds and debentures:	
Lackawanna Steel Company.....	\$1,749,700.00
Subsidiary companies.....	315,950.00
Rentals and royalties.....	101,536.00
	2,167,186.00
Balance (deficit).....	\$585,807.54
Less—Appropriations:	
For extinguishment of mines and mining investments.....	\$226,848.47
For depreciation and accruing renewals.....	839,788.57
	1,066,637.04
Deficit for the year.....	\$1,652,444.58
Surplus January 1, 1914.....	7,514,876.71
Balance of surplus.....	\$5,862,432.13
Less:	
Dividends.....	\$350.00
Fire loss in excess of amount recovered by insurance.....	\$4,624.93
	84,974.93
Surplus December 31, 1914.....	\$5,777,457.20

In his accompanying remarks to the stockholders, President E. A. S. Clarke says:

The results of 1914 are the worst the steel trade of the United States has known since the company has been in operation. The new tariff, which began toward the end of 1913 to influence prices downward, through possibility of foreign competition, kept them during 1914 at as low a level, having regard to the increases in cost of production due to higher cost of labor and taxes, as has ever obtained. In addition, uncertainty as to the effect of existing and proposed legislation so impaired confidence that the volume of all business was greatly decreased, and the consumption of steel reduced to practically the bare necessities of current needs. The outbreak of war in Europe prevented the improvement which it was expected might follow the wonderful crop yield; and the granting of increased rates to the railroads, while gratifying as showing that the Interstate Commerce Commission recognizes that these great public utilities must be permitted to earn a fair return on their investment, came too late to have much effect on the business of 1914.

This situation is strongly reflected in the results of the company's operations. Shipments are with one exception the lowest in its history; the average price of \$28.08 per gross ton received for the materials shipped is \$2.26 less than in the preceding year, and the deficit is \$326,171.51 greater than that of 1908, the only other year in which the company has shown a deficit.

Such a situation is abnormal, considering the large amounts spent on additions and improvements to the plants and properties and the economies resulting therefrom; but the explanation lies in the fact that average prices received per gross ton were \$3.55 less than in 1908, while rates of wages paid averaged about 11 per cent. higher and were maintained at this level throughout the industry in spite of the reduced volume of business. Yet most of the employees, owing to working but a little over half of the normal time, suffered a loss of income equivalent to a very drastic reduction in rates of wages.

The company received during 1914 from mines which it owns, or is interested in, and from other sources, 623,569 gross tons of iron ore and produced a total of 552,761 gross tons of coke and 499,219 gross tons of pig iron. It also produced 118,175 gross tons of Bessemer ingots and 535,661 gross tons of open-hearth ingots, a total of 653,836 tons of steel ingots of all kinds. Shipments of products were as follows, all

in gross tons, the figures for previous years being given for comparison:

	1914	1913	1912	1911	1910
Standard rails.....	176,877	336,339	303,100	225,699	363,577
Light rails.....	6,384	3,376	14,499	18,521	26,288
Angle bars, fittings, etc.....	47,788	75,606	68,782	35,424	60,071
Structural shapes.....	85,568	138,538	116,201	116,581	146,641
Plates.....	25,941	57,529	64,570	52,756	87,469
Merchant steel products.....	102,259	163,887	148,454	77,010	67,150
Sheet bars, slabs, billets and blooms.....	44,464	62,045	99,445	92,967	159,761
Pig iron and miscellaneous.....	90,461	142,601	168,495	141,405	171,558
Total.....	579,742	984,921	983,546	760,363	1,082,515

The company's properties have been maintained in high physical condition and are in better shape than ever before. The equipment of open-hearth furnaces is such as to supply the maximum demand for that grade of steel as rapidly as it presents itself.

During the year \$188,000 face value of bonds of subsidiary companies was redeemed and canceled and \$975,000 face value of the company's 5-year convertible gold debentures was purchased in the market and placed in the treasury, making a total of \$3,214,000 face value of these debentures owned as of December 31, 1914. While the working capital, as shown by the surplus of current assets over current liabilities, has decreased \$1,714,374.77, it is still ample for the company's needs, standing at \$16,540,936.83. Cash on hand and in banks amounts to \$2,261,088, a decrease of \$263,649.26.

Of the company's gold debentures, \$9,994,000 face value now outstanding will mature March 1 next and \$3,994,000 of these will be redeemed and canceled. The company has sold at a satisfactory price \$6,000,000 face value of its two-year 6 per cent. gold notes to be dated March 1, 1915, the proceeds from which will be applied toward payment of the remaining \$6,000,000 of debentures. After this financing has been completed the company's annual fixed charges will be reduced \$139,700.

Orders on hand have increased since January 1; the outlook is for a continuing increase during the balance of the first six months, and it is hoped that the year 1915 will show improvement over 1914.

The Otto Coking Company is building for the Lackawanna Steel Company at Buffalo a plant for the extraction of benzol from the by-products of its coke ovens. The company has already sold the estimated production of benzol for the entire year 1915 at a favorable price. It is expected that the benzol plant will be in operation between June 1 and 15.

## Railway Steel Spring Report

The income account of the Railway Steel Spring Company for the year ended December 31, 1914, reflects the general depression in the railroad equipment business. Gross earnings decreased from \$7,688,185 to \$4,351,465, a loss of \$3,336,720, or 43 per cent. The year's operations show a deficit of \$570,546 after payment of \$945,000 dividends on the preferred stock. However, the company still has a comfortable surplus, \$3,954,657.

The income account is as follows:

	1914	Decrease
Gross earnings.....	\$4,351,465	\$3,336,720
Operating expenses.....	3,638,180	2,577,912
Net earnings.....	713,285	758,808
Bond interest.....	338,831	11,602
Balance for dividends.....	374,454	747,206
Preferred dividends.....	945,000	†.....
Deficit.....	570,546	*747,206
Previous surplus.....	4,525,203	*176,660
Total surplus.....	3,954,657	570,546

†Unchanged. \*Increase.

The retiring directors were re-elected at the annual meeting.

At the annual meeting of the Bucyrus Company, held at Milwaukee, the stockholders re-elected the directors and officers as follows: W. W. Coleman, president; E. K. Swigert, vice-president; G. A. Morison, secretary; and D. P. Eells, treasurer.

ESTABLISHED 1855

# THE IRON AGE

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## The Steel Market Revival

The uppermost question in the steel market today relates to the character, and, therefore, probable extent of the revival in demand which began some three months ago. Inasmuch as iron has so often proved to be the barometer of general trade, developing movements in advance of those in trade generally, it is particularly difficult to forecast the future of the iron and steel market by reference to general trade conditions. In a measure, that would be like forecasting weather conditions and thereupon predicting whether the barometer was about to rise or fall. It is well, therefore, to study what has occurred and is occurring in the steel market itself, and particularly by the comparative method.

That there has been a general improvement in steel market conditions goes without saying; the question is whether the improvement is to be continued, and if so how long? The early stages of a great movement do not present distinctly different developments from those that occur in small recoveries. In the past ten years we have had three great movements, 1905-6, 1909 and 1912, while there has been an equal number of minor movements of sufficient importance to impress themselves upon the mind of the ordinary market observer, there being one early in 1911 and two in 1914, falling respectively at the beginning and at the middle of the year.

The major movements last until actual consuming demand has been satisfied or some untoward development checks the expression of the demand. The great period of activity, 1905-6-7, ended according to the calendar with the financial panic of October, 1907, but careful scrutiny led most observers to conclude that it had run its course in any event. The demand, however, was perfectly sound and representative of actual consumption. That was not entirely the case with the next movement, that of 1909, for in the feverish buying of that movement there was an element of speculation that was recognized very clearly later on, if not at the time, one proof being that general business conditions in the early months of 1910 were improving, whereas the demand for iron and steel was falling off. Continually advancing prices had furnished a buying incentive in the second half of 1909 and when prices reached a level the incentive was removed. The movement of 1912 was much the same in general character, but it was less marked

in extent. It had required almost two years of decreasing buying and declining prices to furnish a foundation for the 1912 movement.

The great European conflict that has crippled the resources of the world makes it impossible that there should be at this time such an expansion of actual demand for ultimate consumption as would produce a movement similar to that of 1905-6-7; but comparison with 1909 and 1912 does not lead to as positive a conclusion, for those movements were based partly upon fear of higher prices, and the war, by making possible things that would not occur in normal times, could conceivably produce such fears. There are questions as to supplies of raw materials and as to export demand from belligerents or neutral countries that make many things possible.

Since the movement of 1912 and its collapse in 1913 there have been two abortive attempts at iron and steel market recovery, falling, as already noted, at the beginning and at the middle of 1914. The recent movement does not compare closely with that at the beginning of 1914. On the one hand it has lasted a longer period of time, but on the other hand it has been much less marked in extent. The increase in pig-iron production, from the low average of December, 1913, to the high average of March, 1914, was 18 per cent., while the gain recently has been 29 per cent., comparing the December rate with that of early March; but the present rate is 17 per cent. under that of a year ago. While the proportionate increase is greater, the real test is where the improvement leads the industry, and the fact is that activity is now less than it was a year ago. A comparison of steel prices shows precisely the same thing, that this year the actual advance from the recent low point has been greater than that of a year ago, but the present level of prices is not altogether as high as that of March, 1914.

The movement of last summer was much less distinct than the present movement has been thus far, there being then scarcely any increase in productive activity, while such price advances as occurred last summer were due chiefly to the temporary scare as to raw material supplies and export demand.

While the present movement has not distinguished itself from minor movements that have occurred in the past, it has one decided merit, that it has not proceeded in such a way as to invite a reaction. There is no room for a return to the conditions of last October and November, for those



conditions were due to a great scare, such as cannot conceivably occur twice from the same cause. Judgment must be suspended as to whether the present movement is to lead directly to a period of prosperity of real note, but it seems clear that some ground has been permanently gained.

### Looking Forward in the Ore Trade

In the old days when the bulk of the Lake Superior iron ore output was sold in the open market, the mining companies and their selling agents at Cleveland were perforce the arch speculators of the iron trade. Their decisions as to the vessel rates they would pay, the ore prices they would ask and the amount of ore they would bring down were often made weeks before the ice was out of the upper lake channels and months before the developments in pig iron and steel were pronounced enough to determine the character of the year's business. They were bound to base their forecasts in no small measure on existing conditions or on the results of the previous year. If a calendar year ended with a pig-iron rise under way it was almost a certainty that the ore price for the following year would be advanced. Some serious mistakes resulted. Notorious among them was the high ore price of 1896, the year of the free-silver campaign, following the soda water rise in the Bessemer pig-iron market in the fall of 1895. In that case the ore men put their prices much too high. On the other side of the account were years like 1899 when old range Bessemer ore sold at \$3 at Lake Erie port, or only 25 cents above the low figure of 1898. Scarcely had the \$3 rate been fixed in February, 1899, when pig iron began shooting upward, and quickly all the ore in sight was snapped up. The pig-iron producers made more money that year than in five that preceded. Some part of this the ore men tried to get by fixing their price for 1900 at \$5.50—the high figure of the past 25 years.

Steel company ownership of vessels and iron mines has taken much of the speculative element out of the iron ore market. The back-lash of movements in pig iron or steel that were nearing their end as the ore season opened, though the end was not perceived, no longer plagues ore sellers as much as in the old days. But the ore departments of steel companies, in common with the merchant ore companies of today, must still make plans for production and shipments 12 months, 15 months and longer in advance of the charging of the last of that season's shipment into the blast furnace.

Just now the ore companies—producer-consumers as well as merchant sellers—are canvassing the probabilities as to the movement of 1915. There are large stocks of Lake ores in furnace yards. Furnace operations declined after navigation closed last year to a rate of 18,000,000 tons a year. They are now, three months later, at the rate of more than 23,000,000 tons a year. The change has been rapid, considering all the conditions. It might be argued that if so soon we have come close to the average rate of pig-iron production last year, when the total was 23,300,000 tons, there is a fair prospect of exceeding the 1914 record in 1915. The main matters of doubt are the war and the volume of railroad demand, with the common reckoning that the former will be with us far into the year

and that a large increase in the latter will not come in 1915.

Applying the usual reckoning of two tons of ore to one ton of pig iron, a production of pig iron in 1915 equal to that of last year would mean 47,000,000 tons of ore. The Lake Superior region contributes 80 to 82 per cent. of the total. That would mean 37,000,000 to 38,000,000 tons of lake ore, less whatever deduction may be due to the stocks carried over in furnace yards above the reckonings at the close of the last season of navigation.

The cutting off of overseas ore by the war might be thought of as giving an opening for Lake Superior ores in the East. But Eastern furnaces dependent on the market for their supply have still very considerable ore piles on hand and Eastern magnetites and Wabana hematites will be available to meet any demand that now seems likely apart from the small lots of high grade Lake ores of low moisture that might come over the mountains in a year of low prices.

Naturally ore producers will delay the opening of the market as long as possible to get the largest effect of any improvement that may develop in March or April. Last year prices were announced in May, but even with the reductions of 65 and 55 cents in Bessemer and non-Bessemer ores the opening caused no stir, pig-iron prices in the common thinking having already discounted lower ore. The year has developed no trade conditions favoring an advance, and the hardships of 1914 to the mining interests of Lake Superior make it quite certain that the lowest price since 1904 will not be further reduced.

It is notable that in the past 25 years the record of Lake Superior mines shows but one instance in which a year of declining production was followed by another of still smaller output; those two years were 1903 and 1904. Only twice have shipments failed to make a new high record after a year of diminished output, those years being 1894 and 1904. The precedents are thus for a larger output in 1915 than in 1914, which with a total of 32,729,726 tons fell more than 17,000,000 tons behind the record of 49,947,116 tons in 1913.

### Discouraging Shipowners

Our merchant marine appears destined to be driven from the sea instead of being built up. The recent great revival of public interest in ocean transportation, which was expected to bring forth practical methods of stimulating American shipping, has not only been futile but one of the last acts of the recent Congress was to impose further restrictions on shipowners. The La Follette shipping bill must have been passed under a misconception in the minds of some members of Congress regarding its effects. It was simply a measure brought forward by labor union leaders and was solely in the interest of labor organizations. It is most remarkable that the President, with his passionate devotion to freedom, should have approved a bill which still further hampers American owners of ships in employing men to operate them. Our deep sea merchant marine had previously suffered from sufficiently onerous regulations that should have been wiped out for the purpose of enabling our

vessels to compete on more even terms with those sailing under foreign flags. The handicap, however, is still more heavily increased. The statement is made that this measure enacts what will practically become 20 international lawsuits with as many maritime powers having treaties with us. Such regulations will be imposed on the owners of foreign ships as are well calculated to breed trouble with other powers whose vessels touch at our ports. It would be impossible for an American shipowner to charge higher rates of freight than his competitors for equal service. The business would undoubtedly be taken by a foreign rival. Yet, under this and other restrictive acts of Congress, it is necessary for an American shipowner to get higher freight rates merely to pay his running expenses.

### Buffalo Coke Discrimination

WASHINGTON, D. C., March 9, 1915.—A complaint alleging discrimination and demanding reparation in the sum of \$325,000 has been filed with the Interstate Commerce Commission by the Buffalo Union Furnace Company and Wickwire Steel Company, Buffalo, against the Buffalo & Susquehanna, Pennsylvania, Delaware, Lackawanna & Western, Erie, Lehigh Valley, New York Central, West Shore, Buffalo, Rochester & Pittsburgh and New York, Chicago & St. Louis railroad companies. The chief allegation of the complainants is that the Rogers-Brown Iron Company, a Buffalo competitor, enjoys discriminating freight rates, which have resulted in forcing them to discontinue the operation of their furnaces for a considerable portion of the latter part of 1914 and during the months of January and February of the present year.

The present rate on coke in carloads from the Connellsville coke district to Buffalo territory is \$1.85 per ton. Substantially all the coke used in the Buffalo district is shipped from the Connellsville district and from places in the northwestern part of Pennsylvania embraced in what is known as the Reynoldsville district, including the towns of Sykes, Tyler, Punxsutawney and DuBois. Complainants contend that as these towns are distant from Buffalo from 159 to 188 miles they should have similar rates on coke to the Buffalo territory and, in fact, do have similar rates on coal. As a matter of fact, however, while the rate from Punxsutawney, distant about 180 miles, and from DuBois, distant about 159 miles, is \$1.45 per ton, a rate is now maintained from Sykes, distant 188 miles, and from Tyler, distant 168 miles, of \$1.05 per ton. As an explanation of the low rate from Tyler and Sykes the complainants charge that the same persons, or many of them, are directly or indirectly, to a very large extent, interested in the Rogers-Brown Iron Company and in the coke-producing companies operating plants at Tyler and Sykes, and that substantially all the coke produced at Tyler and Sykes is shipped to the Rogers-Brown Iron Company over the Pennsylvania Railroad under the \$1.05 rate.

Anticipating the contention on the part of the defendants that the rate of \$1.05 from Tyler and Sykes to the Buffalo district has been in force many years and therefore was not made for the purpose of discriminating in favor of the Rogers-Brown Iron Company, the complainants say that it was limited to shipments of coke over the lines of the Buffalo & Susquehanna Railroad, which did not transport any coke to the Buffalo territory from any places other than Tyler and Sykes. They are now informed, however, that the Buffalo & Susquehanna Railroad has been, or is about to be, abandoned, and that the Pennsylvania Railroad, as indicated by a tariff it has recently promulgated, is attempting to perpetuate a discrimination which is unjust and destructive of the complainants' business.

As a result of being obliged to pay a rate on coke 40c. higher than that charged by the defendant carriers to their competitors, the complainants assert that a disadvantage has been created which amounts to a difference of 50c. per ton on the cost of producing pig iron. Hence the complainants declare they have been dam-

aged to that extent for every ton of pig manufactured by them since the discriminatory rates went into force. The Buffalo Union Furnace Company alleges that three of its furnaces were out of blast for periods ranging from 22 to 104 days prior to January 1 and for various periods since that date, while the Wickwire Steel Company asserts that both of its furnaces during the same time have lost 91 days. The Rogers-Brown Iron Company, it is alleged, has operated all of its furnaces without interruption during the periods referred to.

W. L. C.

### Another Vote on Sheet and Tin-Plate Wages

On Friday, March 5, at Pittsburgh, another conference was held between officials of the Amalgamated Association and owners of sheet and tin-plate mills in the Central West that have asked for a reduction in the scales of wages. The Amalgamated officials having pleaded with their members that it would be good policy for them to agree to accept a reduction, dividing it around among all classes of labor in the mills, on their request another conference was held and the proposition was made to the manufacturers that another vote be taken. This second referendum vote will be cast on Saturday, March 13. The proposed reductions in sheet mills are as follows: Rollers, 13 per cent.; heaters, 12 per cent.; shearmen, roughers, catchers and pair heaters, 11 per cent.; matchers and doublers, 6 per cent. In tin-plate mills the reductions are: Rollers, 8 per cent.; doublers, heaters, roughers and shearmen, 6 per cent.; catchers and screwboys, 3 per cent.

Reports that two sheet mills that heretofore have signed the Amalgamated Association scales have withdrawn from that organization are officially denied. Should the proposed reductions be accepted by the men, they will become effective from March 1. There will also be 60-day settlements, the rates of wages for sheet and tin-plate mills for each two months to be determined by the average selling price of sheets and tin plate for the previous two months, as has long been the practice in the bar-iron trade.

### Milliken Brothers, Inc., Had Deficit in 1914

Milliken Brothers, Inc., 17 Battery place, New York, structural fabricator, reports a deficit in operations for the year ended December 31, 1914, of \$91,661. This deficit is made up of \$14,661, losses on contracts completed, and \$77,000, reserve for anticipated losses on uncompleted contracts. Completed contracts during the year aggregated \$688,034. Vice-President Francis Dykes reports that the company maintained a substantial cash balance throughout the year and at the close had \$199,033 on hand. At no time in the year did the company borrow money. The office force in Mexico has been reduced. The offices in San Francisco and in London have been continued under conditions favorable to the company and a new representation has been established in Argentina. The company's main structural shops are now running to capacity, with work ahead for several months.

### American Locomotives for New Zealand

The New Zealand authorities, according to Commerce Reports, have placed an order with the Baldwin Locomotive Works for 10 locomotives of the first class, competitors for the contract being several English firms. Price and particularly time of delivery were deciding factors. The best English offer was that of the North British Company to complete 10 engines in 7 months at \$23,262 each. The Baldwin offer was 10 engines in 60 days at \$15,714 each. A delivery by Easter was desired and this will be done. The statement is made that the Baldwin engines have heretofore given great satisfaction. The present government does not propose to import any passenger coaches or freight cars.

The Steel Barrel Company of America, manufacturer of gasoline, chemical and lubricating oil drums, has removed its office to 29 Broadway, New York. The company's factory is in Newark, N. J.



## LIABILITY RELEASE RATES END

## Important Railroad Legislation in the Last Hours of Congress

WASHINGTON, D. C., March 9, 1915.—A law of great importance to all shippers of class freight was enacted by Congress in the closing hours of the session which adjourned March 4. It places upon all carriers subject to the control of the Interstate Commerce Commission the obligation to pay to shippers the full amount of any loss or damage to goods carried by them, irrespective of any special agreement that may have been entered into for the release of the carriers' liability in consideration of a reduced freight rate. The measure was the subject of extended hearings before the House Committee on Interstate and Foreign Commerce. Hope of its passage had been practically abandoned when, at the last moment, it was taken up by members of the House committee, put through the House under whip and spur, agreed to in conference and signed by the President a few minutes before adjournment.

The new statute is designed to put an end to a practice of long standing under which shippers, in consideration of a special freight rate, published in connection with regular rates in tariffs filed with the commission and usually about 10 per cent. less than the regular rate, agree to release the carrier from liability for loss or damage in excess of a stipulated rate per 100 lb. The effect of this practice is to transfer from the carrier to the shipper a part of the risk of loss or damage in consideration of a 10 per cent. cut in rates. The new law amends section 7 of the interstate commerce act so as to provide that any common carrier subject to the supervision of the commission, receiving property for interstate transportation or for shipment to a foreign country, shall issue a receipt or bill of lading therefor and be liable for any loss, damage, or injury to such property caused by it or by any common carrier to which such property may be delivered or over whose lines it may pass, "and no contract, receipt, rule, regulation or other limitation of any character whatsoever shall exempt such common carrier from the liability here imposed." It is further provided that any such carrier shall be liable to the party entitled to a receipt or bill of lading for goods transported, whether such receipt or bill has actually been issued or not, "notwithstanding any limitation of liability or limitation of the amount of recovery or representation or agreement as to value in any such receipt or bill of lading, or in any contract rule, regulation, or in any tariff filed with the Interstate Commerce Commission; and any such limitation, without respect to the manner or form in which it is sought to be made, is hereby declared to be unlawful and void." These requirements are subject to the following provisos:

Provided, however, that if the goods are hidden from view by wrapping, boxing, or other means, and the carrier is not notified as to the character of the goods, the carrier may require the shipper to state specifically in writing the value of the goods, and the carrier shall not be liable beyond the amount so specifically stated, in which case the Interstate Commerce Commission may establish and maintain rates for transportation, dependent upon the value of the property shipped as specifically stated in writing by the shipper. Such rates shall be published as are other rate schedules: Provided further, that nothing in this section shall deprive any holder of such receipt or bill of lading of any remedy or right of action which he has under the existing law: Provided further, that it shall be unlawful for any such carrier to provide by rule, contract, regulation, or otherwise a shorter period for giving notice of claims than 90 days, and for the filing of claims for a shorter period than four months, and for the institution of suits than two years: Provided further, that if the loss, damage, or injury complained of was due to delay or damage while being loaded or unloaded, or damaged in transit by carelessness or negligence, then no notice of claim nor filing of claim shall be required as a condition precedent to recovery.

There is a division of opinion here as to whether the practical effect of the new law will be beneficial or injurious to the railroads. Officials of the Interstate Commerce Commission are disposed to regard it as a skillful

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method of abolishing the special rates on class freight and as equivalent to a 10 per cent increase in many comprehensive tariffs. During the hearings before the House committee, however, the measure was strongly advocated by certain associations of shippers who alleged that the release clauses were manipulated in bills of lading in such a manner as to reduce the carriers' liability without a clear understanding on the part of the shipper. Whatever the exact merits of the new statute may be, its enactment will be promptly followed by the cancellation of liability release rates in all existing tariffs and the railroads will thus secure an actual increase in a material proportion of class rates without the formality of a proceeding before the Interstate Commerce Commission.

W. L. C.

The Wagner Electric Mfg. Company, St. Louis, has received a contract for \$100,000 worth of electrical machinery to be installed in a plant to be equipped in Paris, France, for the manufacture of munitions of war. The company also has a separate contract for the supply of a considerable amount of material for an ammunition container for its Paris customer, Le Clairage Electrique Compagnie, pending the completion and installation of the electric equipment.



# The Iron and Metal Markets

## 35,000 TONS ALGOMA RAILS

### The Sale to the Illinois Central Railroad

#### Shipyards Filling Up—Gain in Steel Corporation Orders, 96,803 Tons

Negotiations closed in the past week bring the Illinois Central's purchase of open-hearth rails from the Algoma Steel Company's mill in Ontario up to 35,000 tons. The price delivered at Chicago is understood to be \$2.60 a ton less than that of Chicago mills. An issue was made also of new provisions in the Illinois Central specifications. There are side-lights on this transaction which will not be publicly discussed, but it may yet have its value as an object lesson in the effects of free access to this market for Canadian rails, wire and other products, while on many American steel products going to Canada the duties, already high, have just been increased 7½ per cent.

The Algoma rail mill has now booked 60,000 tons of rails on this side and 80,000 tons from the Canadian Pacific. It still has capacity for 75,000 to 100,000 tons of American rails for delivery in the navigation season of 1915.

Chicago rail sales of the week include 11,000 tons for the Lake Shore railroad and 9000 tons for a line the Keystone Construction Company is building in Kansas. The B. & O. placed 7000 tons at Pittsburgh; the Terminal Railway of St. Louis bought 3000 tons and the United Railways of St. Louis 1400 tons. The Burlington's recent order was for 6000 tons and that of a New England road for 10,000 tons. An export order from Colombia calls for 1200 tons.

While buying by manufacturing consumers of iron and steel has been light this month, the expectation is that the present rate of operations will hold through March and there is the hope that spring demand will be a factor by April.

The Steel Corporation's steel works are running this week at 67 per cent of ingot capacity. The Homestead plant is not supplied with orders insuring full output for several months, as widely published. Just now 85 per cent. of its steel capacity is active but this is due to special plate orders for pipe work.

The Steel Corporation's statement of March 10 showing 96,803 tons gain in unfilled orders last month, against 412,000 tons in January, is favorable in the light of the large inroads made in February by the heaviest mill shipments in months.

Fresh war orders for barb wire and shrapnel steel have come just as there were predictions of the tapering off of that business. In both lines 40,000 to 50,000 tons has been closed for export this month. A good sized plate order has been taken for Japan for shipment from Chicago and Japan has also placed 1500 tons of galvanized sheets here.

Work is still pouring in upon Eastern shipyards. The latest orders are for five vessels for which Pittsburgh will furnish 15,000 to 20,000 tons of plates and shapes. Inquiries for five or six more have come up this week. Lake shipyards

have just had inquiries for two ore vessels, representing 6500 tons of steel.

The wire trade is quite content if the advance to \$1.60 for nails brings in specifications on bookings at \$1 or \$2 a ton less. As to other price advances, particularly in bars, plates and shapes, the issue has not been fairly made as yet. In plates the situation east of Pittsburgh has been such as to develop the 1.10c., Pittsburgh, price in a number of cases. In the Central West an increase in tank work has helped the plate mills in the absence of car orders.

Structural contracts of the week amounted to 33,000 tons, of which 20,000 tons was let in the East, and that trade shows some signs of spring betterment, though not in price.

Pipe alone of the galvanized products has not advanced with the rise in spelter, but an announcement is expected. In galvanized sheets little business has been done on the 3.40c. basis, jobbers being able to make a good profit at less than that.

Central Western foundries are beginning to buy pig iron for the third quarter and second half and furnaces in northern and southern Ohio and the Chicago district have been competing keenly for Indiana and Ohio business. It appears that Alabama No. 2 iron can be had at \$9.50 for the second half and lower sales have been made for early delivery. Several sales of Bessemer and low phosphorus iron for England and Italy have been made in the East and 10,000 tons more is under negotiation.

Some reservations of Lake Superior ores have been made this week at prices which will be written in the contracts later, when the 1915 basis is established. Indications now point to a continuance of the 1914 prices.

Several steel companies, including one in Canada, have been urgent buyers of domestic ferromanganese lately. One 500-ton shipment is promised from Great Britain, but the dragging on of the situation there is not liked. Some electrolytic ferromanganese is offered from a western New York furnace and small sales have been made at \$100, with \$78 seaboard asked for the British metal, to be shipped when available.

## A Comparison of Prices

Advances Over the Previous Week in Heavy Type,  
Declines in Italics

At date, one week, one month, and one year previous.

	Mar. 10,	Mar. 3,	Feb. 10,	Mar. 11,
<b>Pig Iron, Per Gross Ton:</b>	1915.	1915.	1915.	1914.
No. 2 X, Philadelphia...	\$14.25	\$14.25	\$14.25	\$15.00
No. 2, Valley furnace...	13.00	13.00	13.00	13.25
No. 2, Southern, Cin'ti...	12.40	12.40	12.40	14.00
No. 2, Birmingham, Ala...	9.50	9.50	9.50	10.75
No. 2, furnace, Chicago*	12.75	13.00	13.00	14.25
Basic, del'd, eastern Pa...	13.50	13.50	13.50	14.00
Basic, Valley furnace...	12.50	12.50	12.50	13.00
Bessemer, Pittsburgh...	14.55	14.55	14.55	15.15
Malleable Bess., Ch'go*	13.00	13.00	13.00	14.25
Gray forge, Pittsburgh...	13.45	13.45	13.45	13.65
L. S. charcoal, Chicago...	15.75	15.75	15.75	15.25
<b>Billets, etc., Per Gross Ton:</b>				
Bess. billets, Pittsburgh...	19.50	19.50	19.50	21.00
O.-h. billets, Pittsburgh...	19.50	19.50	19.50	21.00
O.-h. sheet bars, P'gh...	20.50	20.50	20.50	22.00
Forging billets, base, P'gh	24.00	24.00	24.00	25.00
O.-h. billets, Phila. ....	21.52	21.52	21.40	23.40
Wire rods, Pittsburgh...	25.00	25.00	25.00	26.50

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

## Old Material, Per Gross Ton:

	Mar. 10, 1915.	Mar. 3, 1915.	Feb. 10, 1915.	Mar. 11, 1914.
Iron rails, Chicago.....	12.00	12.00	11.50	12.75
Iron rails, Philadelphia....	13.00	13.00	13.00	16.50
Carwheels, Chicago.....	10.00	10.00	10.00	11.75
Carwheels, Philadelphia....	11.00	11.00	10.50	12.75
Heavy steel scrap, P'gh....	12.00	12.00	11.50	12.25
Heavy steel scrap, Phila....	10.50	10.50	10.00	11.50
Heavy steel scrap, Ch'go....	9.75	9.75	9.50	9.75
No. 1 cast, Pittsburgh....	11.25	11.25	11.25	11.50
No. 1 cast, Philadelphia....	12.00	12.00	12.00	13.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	10.50

## Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia....	1.15	1.15	1.20	1.25
Iron bars, Pittsburgh....	1.10	1.10	1.10	1.40
Iron bars, Chicago.....	1.10	1.10	1.02½	1.15
Steel bars, Pittsburgh....	1.15	1.15	1.10	1.20
Steel bars, New York....	1.319	1.319	1.26	1.36
Tank plates, Pittsburgh....	1.10	1.10	1.10	1.20
Tank plates, New York....	1.269	1.269	1.26	1.36
Beams, etc., Pittsburgh....	1.15	1.15	1.10	1.20
Beams, etc., New York....	1.319	1.319	1.26	1.36
Skelp, grooved steel, P'gh	1.10	1.10	1.10	1.20
Skelp, sheared steel, P'gh	1.15	1.15	1.15	1.25
Steel hoops, Pittsburgh....	1.25	1.25	1.20	1.30

## Sheets, Nails and Wire,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	1.80	1.80	1.80	1.95
Galv. sheets, No. 28, P'gh.	3.40	3.40	3.00	2.95
Wire nails, Pittsburgh....	1.60	1.60	1.55	1.60
Cut nails, Pittsburgh....	1.55	1.55	1.50	1.65
Fence wire, base, P'gh....	1.40	1.40	1.35	1.40
Barb wire, galv., P'gh....	2.10	2.10	1.95	2.00

## Coke, Connellsville,

Per Net Ton at Oven:				
Furnace coke, prompt....	\$1.50	\$1.50	\$1.50	\$2.00
Furnace coke, future....	1.65	1.65	1.65	2.00
Foundry coke, prompt....	2.00	2.00	2.00	2.50
Foundry coke, future....	2.15	2.15	2.15	2.75

## Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York....	15.25	15.25	15.25	14.75
Electrolytic copper, N. Y.	14.75	14.62½	14.75	14.25
Spelter, St. Louis.....	11.00	10.35	8.00	5.15
Spelter, New York.....	11.25	10.50	8.25	5.30
Lead, St. Louis.....	3.87½	3.85	3.67½	3.90
Lead, New York.....	3.95	3.90	3.80	4.00
Tin, New York.....	47.00	40.75	36.00	38-12½
Antimony, Hallett's, N. Y.	25.00	22.00	18.50	6.90
Tin plate, 100-lb. box, P'gh.	\$3.20	\$3.10	\$3.10	\$3.30

## Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal has no stability, being dependent on vessel charges.

**Plates.**—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c. to 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in....	.10
Gauges under 3-16 in. to and including No. 8....	.15
Gauges under No. 8 to and including No. 9....	.25
Gauges under No. 9 to and including No. 10....	.30
Gauges under No. 10 to and including No. 12....	.40
Sketches (including straight taper plates), 3 ft. and over.....	.10
Complete circles 3 ft. in diameter and over....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive firebox steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05

Widths over 110 in. up to 115 in., inclusive..... .10  
Widths over 115 in. up to 120 in., inclusive..... .15  
Widths over 120 in. up to 125 in., inclusive..... .25  
Widths over 125 in. up to 130 in., inclusive..... .50  
Widths over 130 in..... .1.00  
Cutting to lengths, under 3 ft. to 2 ft. inclusive..... .25  
Cutting to lengths, under 2 ft. to 1 ft. inclusive..... .50  
Cutting to lengths, under 1 ft..... .1.55  
No charge for cutting rectangular plates to lengths 3 ft. and over.

**Wire Products.**—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.40; galvanized, \$1.80. Galvanized barb wire and fence staples to jobbers, \$2.10; painted, \$1.60. Wire nails to jobbers, \$1.60. Galvanized nails, 1 in. and longer, \$1.20 advance over base price; shorter than 1 in., \$1.70 advance over base price. Woven wire fencing, 72 per cent. off list for carloads; 71 off for 1000-rod lots; 70 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

## Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed.....	\$1.50	\$1.55	\$1.60	\$1.65	\$1.75	\$1.85	\$1.95	\$2.05
Galvanized.....	2.00	2.05	2.10	2.15	2.25	2.35	2.75	2.85

**Wire Rods.**—Bessemer, open-hearth and chain rods, \$25.

**Structural Material.**—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.15c.

**Wrought Pipe.**—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from February 11, 1915, and iron pipe from February 12, 1915, all full weight.

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
½, ¾ and 1.....	73	52½	½ and ¾.....	66	47
1½.....	77	65½	1.....	65	44
¾ to 3.....	80	69½	¾.....	69	54
			¾ to 2½.....	72	59

## Lap Weld

2.....	77	66½	1½.....	56	43
2½ to 6.....	79	68½	1½.....	67	54
7 to 12.....	77	66½	2.....	68	56
13 and 14.....	63½	..	2½ to 4.....	70	59
15.....	61	..	4½ to 6.....	70	59
			7 to 12.....	68	58

## Reamed and Drifted

1 to 3, butt.....	78	67½	1 to 1½, butt.....	70	57
2, lap.....	75	64½	2, butt.....	70	57
2½ to 6, lap.....	77	66½	1½, lap.....	54	41
			1½, lap.....	65	52
			2, lap.....	66	54
			2½ to 4, lap.....	68	57

## Butt Weld, extra strong, plain ends

¼, ¾ and 1.....	68	55½	¾.....	63	50
1½.....	73	64½	1.....	67	58
¾ to 1½.....	77	68½	¾ to 1½.....	71	60
2 to 3.....	78	69½	2 and 2½.....	72	61

## Lap Weld, extra strong, plain ends

2.....	74	63½	1½.....	65	55
2½ to 4.....	76	65½	1½.....	66	57
4½ to 6.....	75	64½	2½ to 4.....	70	59
7 to 8.....	69	58½	4½ to 6.....	69	58
9 to 12.....	64	53½	7 to 8.....	63	53
			9 to 12.....	58	47

## Butt Weld, double extra strong, plain ends

¼.....	63	54½	¾.....	57	47
¾ to 1½.....	66	57½	¾ to 1½.....	60	50
2 to 2½.....	68	59½	2 and 2½.....	62	52

## Lap Weld, double extra strong, plain ends

2.....	64	55½	2.....	58	47
2½ to 4.....	66	57½	2½ to 4.....	60	52
4½ to 6.....	65	56½	4½ to 6.....	59	51
7 to 8.....	59	48½	7 to 8.....	52	42

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

**Boiler Tubes.**—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1½ and 2 in.....	62	1½ in.....	45
2½ in.....	59	1½ and 2 in.....	49
2½ and 2¾ in.....	65	2½ in.....	45
3 and 3½ in.....	70	2½ and 2¾ in.....	54
3½ and 4½ in.....	72	3 and 3½ in.....	57
5 and 6 in.....	65	3½ and 4½ in.....	60
7 to 13 in.....	62	5 and 6 in.....	49



**Sheets.**—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets	
	Cents per lb.
Nos. 3 to 8.....	1.25 to 1.30
Nos. 9 to 10.....	1.30 to 1.35
Nos. 11 and 12.....	1.35 to 1.40
Nos. 13 and 14.....	1.45 to 1.50
Nos. 15 and 16.....	1.55 to 1.60

Box Annealed Sheets, Cold Rolled	
	Cents per lb.
Nos. 10 and 11.....	1.45 to 1.50
No. 12.....	1.45 to 1.50
Nos. 13 and 14.....	1.50 to 1.55
Nos. 15 and 16.....	1.55 to 1.60
Nos. 17 to 21.....	1.60 to 1.65
Nos. 22 and 24.....	1.65 to 1.70
Nos. 25 and 26.....	1.70 to 1.75
No. 27.....	1.75 to 1.80
No. 28.....	1.80 to 1.85
No. 29.....	1.85 to 1.90
No. 30.....	1.95 to 2.00

Galvanized Sheets of Black Sheet Gauge	
	Cents per lb.
Nos. 10 and 11.....	2.40
No. 12.....	2.50
Nos. 13 and 14.....	2.50
Nos. 15 and 16.....	2.60
Nos. 17 to 21.....	2.80
Nos. 22 and 24.....	2.90
Nos. 25 and 26.....	3.05
No. 27.....	3.25
No. 28.....	3.40
No. 29.....	3.55
No. 30.....	3.70

## Pittsburgh

PITTSBURGH, PA., March 9, 1915.

Daily press reports that the Homestead steel works of the Carnegie Steel Company had started up in full on Monday, March 8, giving employment to 4000 men, and would run full for months to come, are untrue and have done much harm. The plant is operating at present to about 85 per cent., 50 of the 62 open-hearth furnaces being in operation. There is a fair amount of work ahead in plates for the Homestead works, but not much in structural material. The Carnegie Company regrets very much that such unreliable reports have been printed, as they have resulted in hundreds of men going to Homestead from other places to get jobs. The situation in the steel trade this week shows no material change. The advance in prices on shapes, plates and bars to 1.15c. for March delivery is being held by mills in this district, but so far little new business has been placed. The spelter situation still dominates, but pig tin is a close second, having advanced to 50c. per lb. for prompt shipment. This has resulted in one maker advancing prices on tin plate on new orders 15c. per box. All steel companies are increasing their operations, and from this standpoint the situation is a good deal better. Whether enough new business will come out in the next month or two to keep up this increased rate of operation is a question that time alone will answer. There has been no further advance in prices of galvanized products, but one is looked for in galvanized pipe. The pig-iron market is dull, and prices are slightly weaker. Consumers of billets and sheet bars are covered for some time ahead, and there is very little new buying. The scrap market is dull but prices are firm. The failure of the German National Bank in this city last week has not disturbed local conditions to any extent, and it is not believed any other banks are involved.

**Pig Iron.**—The only new demand is for small lots of foundry iron. Not enough pig iron of any kind is being sold, however, to establish a market. The output of pig iron in this district is much heavier than several months ago, but the increase is entirely among steel companies' blast furnaces, whose output is not sold in the open market. Prices, which are largely nominal, are as follows: Bessemer iron, \$13.60; basic, \$12.50; malleable Bessemer, \$12.75; No. 2 foundry, \$13 to \$13.25, and gray forge, \$12.50, all at Valley furnace, with a freight rate of 95c. a ton for delivery in the Cleveland and Pittsburgh districts.

**Billets and Sheet Bars.**—Specifications against contracts for sheet bars from the sheet and tin-plate mills continue active. Orders sent to the mills for rolling from the rail and billet bureau of the Carnegie Steel Company show a material increase this month over the same period in February. The Republic and Youngstown Sheet & Tube companies also report specifications for billets and sheet bars as quite active. We quote Bessemer and open-hearth billets at \$18.50, and Bessemer and open-hearth sheet bars, \$19, f.o.b. maker's mill, Youngstown; Bessemer and open-hearth billets, \$19.50 to \$20, and Bessemer and open-hearth sheet bars, \$20.50 to \$21, f.o.b. maker's mill, Pittsburgh. Forging billets are quoted at \$24 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 to 0.60 carbon take \$1 per ton extra. Axle billets are quoted at \$21 to \$22.

**Ferroalloys.**—A new price of \$78, seaboard, has been fixed on English 80 per cent. ferromanganese, but deliveries are subject to the embargo being removed, and also to several other conditions, so that the situation in regard to deliveries on contracts remains about the same, the only difference being that the price is \$10 per ton higher. The Carnegie Steel Company has sold a few small lots of ferromanganese at \$100 and \$105 per ton to consumers that were badly in need of material and could not get deliveries on their contracts. Dealers are quoting \$105 to \$110 in carload lots for prompt shipment from stock, and we note sales of three or four carloads at \$105, delivered to consumers' mills. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$73; over 100 tons to 600 tons, \$72; over 600 tons, \$71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is \$18; 11 per cent., \$19, and 12 per cent., \$20, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at \$25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads, 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

**Steel Rails.**—Some small orders for standard sections are being placed. It is understood that the United States Steel Products Company has taken quite a large contract for rails for shipment to France, which will be rolled at the Edgar Thomson mills of the Carnegie Steel Company. The new demand for light rails is fairly active, the Carnegie Company having received new orders and specifications in the past week for about 3500 tons. We quote standard section rails made of Bessemer stock at 1.25c., and of open-hearth 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots: 8 and 10 lb. section, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c. The above prices on light rails are sometimes cut \$1 per ton or more by the rerolling rail mills.

**Structural Material.**—The King Bridge Company, Cleveland, Ohio, has taken about 10,000 tons of shapes for the Clark street viaduct in that city, which will be rolled by the Carnegie Steel Company. New inquiry remains quiet. The Jones & Laughlin Steel Company has taken 1600 tons for an eight-story building for the Logan-Gregg Hardware Company in this city, and the McClintic-Marshall Company 250 tons for a grain elevator in Baltimore. Local work on which bids will go in soon includes about 1200 tons for the new Syrian Temple in this city, and 500 to 600 tons for an addition to the School of Applied Design at Carnegie Institute. The reported terminal warehouse to be built at Thirteenth and Etna streets in this city, preliminary plans for which call for 5000 tons or more, is still in indefinite shape, and it is not known whether the building will be erected. We quote beams and channels up to 15-in. at 1.15c. for March delivery and 1.20c. for second quarter. We are advised that several large contracts for second quarter have been placed, but so far little new business has been given out at the 1.15c. price for March shipment.

**Plates.**—The Homestead plate mills of the Carnegie Steel Company are running to about 85 per cent. of capacity, largely on orders for plates to be made into



pipe to fill contracts taken by the National Tube Company. The Homestead works is also rolling fairly large orders for plates to be used in boats to be built in Eastern shipyards. No new orders for steel cars have been placed in the past week, and there is no new inquiry. The Pressed Steel Car Company is operating to only 15 to 20 per cent., while the Standard Steel Car Company is running only partly full. A good many orders for tanks are being placed in the oil fields in the West, much of this business being taken by the Riter-Conley Mfg. Company, which is placing large orders for plates with the Carnegie Steel Company. We quote  $\frac{1}{4}$ -in. and heavier plates at 1.15c. for March shipment, and 1.20c. for second quarter. It is said some contracts have been placed at 1.20c. for second quarter delivery, but so far little new business has been placed at 1.15c. for March.

**Sheets.**—New inquiry for both black and galvanized sheets is quiet, but prices on galvanized are firm at 3.40c. for prompt shipment for No. 28. In fact, two mills are quoting 3.50c. for prompt shipment. Specifications against contracts are reported coming in at a fair rate. This week the American Sheet & Tin Plate Company has increased its operations to 68 per cent. of capacity, the highest rate for some time. Other sheet mills are running from 50 to 70 per cent. Several sheet mills that sign the Amalgamated scale are still idle, stating they cannot make and sell sheets at present prices at a profit. The American Sheet & Tin Plate Company has sold 1500 tons of galvanized sheets for shipment to Japan. We quote No. 28 Bessemer black sheets at 1.80c. to 1.85c., No. 28 galvanized at 3.40c., Nos. 9 and 10 blue annealed sheets 1.30c. to 1.35c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

**Tin Plate.**—On Monday, March 8, the American Sheet & Tin Plate Company advanced its price on 14 x 20 coke plates from \$3.20 to \$3.35 per base box. This advance follows the higher price of pig tin, which is quoted to-day at 50c. for prompt shipment. It is not so much the high price, but the question as to whether deliveries of pin tin can be made, that is responsible for the advance. Some tin-plate mills have fair stocks of pig tin on hand, and are covered for some time ahead on contracts, but whether deliveries will be made on these contracts is a question. There is not much new demand for tin plate, as consumers are covered. Specifications are coming in very freely, shipments by the mills being heavy. The American Sheet & Tin Plate Company continues to operate at about 95 per cent. of capacity, and some of the larger independent tin mills are operating about full. We quote 14 x 20 coke plates for prompt shipment on the small orders coming in at \$3.20 to \$3.35 per base box, f.o.b. Pittsburgh.

**Wire Rods.**—The demand is quiet as most consumers are covered up to July. Mills report specifications coming in at a fair rate. Foreign inquiry has subsided, and nothing of moment has been done for some time. We quote Bessemer, open-hearth and chain rods at \$25 to \$25.50, f.o.b. Pittsburgh. One local maker is holding its rods firm at the higher price.

**Shafting.**—Prices are stronger, due to the higher price of steel bars and several makers are not inclined to sell much ahead at present discounts. Most consumers are covered and specifications are coming in freely. We now quote cold-rolled shafting at 67 to 68 per cent. off, delivered in base territory, but it would require a very nice order to secure the higher discount.

**Railroad Spikes.**—There is not much new inquiry, as nearly all the roads have covered for their 1915 needs. Makers are trying to get \$1.40 for railroad spikes on new orders. Railroads are now sending in specifications, and shipments against contracts will start in a short time. We quote standard railroad spikes at \$1.35 to \$1.40, and small spikes at \$1.45 to \$1.50 in carload and larger lots, f.o.b. Pittsburgh.

**Skelp.**—The new demand is only fair. None of the

mills rolling skelp is operating to full capacity. Prices are firm but no higher. We quote grooved steel skelp, 1.10c. to 1.15c.; sheared steel skelp, 1.15c. to 1.20c.; grooved iron skelp, 1.50c.; sheared iron skelp, 1.50c. to 1.60c., delivered to consumers' mills in the Pittsburgh district.

**Hoops and Bands.**—The new demand is quiet, as most consumers are covered through this month and in some cases up to July 1. Specifications are coming in at a fair rate. We quote steel bands at 1.15c. for March delivery and 1.20c. for second quarter, with extras as per the steel bar card. Prices on steel hoops are firm at 1.25c. to 1.30c. at mill.

**Wire Products.**—As yet no new business has been placed at the \$1.60 price on wire nails. Specifications against contracts at former prices are active and shipments by the mills are heavy. There is still an active foreign inquiry for barb wire, and several local makers are regularly making heavy shipments abroad. It is claimed that four of the leading makers of barb wire have exported no less than 150,000 tons of barb wire since the war started. We quote on new orders: Wire nails, \$1.60, galvanized nails 1 in. and shorter taking an advance of \$1.70 over this price, or \$3.30, and galvanized nails, 1 in. and longer, an advance of \$1.20, or \$2.80; plain annealed wire, \$1.40; galvanized barb wire and fence staples, \$2.10; painted barb wire, \$1.60, all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. for cash in 10 days. We quote woven wire fencing at 72 per cent. off in carload lots, 71 per cent. off on 1000-rod lots and 70 per cent. on small lots, f.o.b. Pittsburgh.

**Iron and Steel Bars.**—Not much new business has been placed at 1.15c. for steel bars for March shipment, but we are advised some contracts have been closed for second quarter at 1.20c. Most consumers of steel bars are covered by contracts placed some time ago at 1.10c. and in some cases at 1.05c., and specifications against these contracts are coming in freely, shipments by the mills being heavy. The new demand for common iron bars is fair, but none of the mills is running full time. We quote steel bars for March shipment at 1.15c. and for second quarter 1.20c., f.o.b. Pittsburgh. Common iron bars, made from part scrap, are 1.10c. to 1.15c., maker's mill.

**Merchant Steel.**—Makers report the new demand slightly better and specifications against contracts coming in more freely than for some time. The tone of the market is firmer, but as yet prices are not actually higher. On small lots for prompt shipment we quote: Iron finished tire,  $\frac{1}{2}$  x  $1\frac{1}{2}$  in., and larger, 1.30c., base; under  $\frac{1}{2}$  x  $1\frac{1}{2}$  in., 1.45c.; planished tire, 1.50c.; channel tire,  $\frac{3}{4}$  to  $\frac{7}{8}$  and 1 in., 1.80c. to 1.90c.;  $1\frac{1}{2}$  in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c.

**Cold-Rolled Strip Steel.**—The new demand is fairly active and specifications against contracts are coming in well. The Morris & Bailey Steel Company of this city has filled some large orders for cold-rolled steel for shipment abroad. Prices are firm, and in some cases \$2.80 is obtained for small lots. We quote hard-rolled steel,  $1\frac{1}{2}$ -in. and wider, under 0.20 carbon, sheared or natural mill edges, per 100 lb., \$2.75 delivered. Extras, which are standard among all the mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier.....	Base	\$0.25	\$0.10
0.089 to 0.050.....	\$0.05	0.25	0.15
0.049 to 0.035.....	0.20	0.25	0.15
0.034 to 0.031.....	0.35	0.40	0.25
0.030 to 0.025.....	0.45	0.40	0.40
0.024 to 0.020.....	0.55	0.40	0.50
0.019 to 0.017.....	0.85	0.50	1.10
0.016 to 0.015.....	1.25	0.50	1.10
0.014 to 0.013.....	1.95	0.50	1.25
0.012.....	2.30	0.50	coils only
0.011.....	2.65	0.50	coils only
0.010.....	3.00	0.50	coils only

**Wrought Pipe.**—No advance in prices of galvanized iron and steel pipe has yet been made, but one is looked for. The new demand for tubular goods is more active,

the mills entering more orders at present than for some time. Several large gas and oil lines in the West are in the market. One of these involves nearly 600 miles of large pipe. Discounts on iron and steel pipe are being firmly held.

**Boiler Tubes.**—The new demand continues quiet, and is mostly for small lots. Consumers are covered for some time ahead, and specifications against contracts are fair. Discounts on both iron and steel boiler tubes are still being shaded.

**Coke.**—The market is dull, there being practically no new demand. Several blast furnaces that have not covered for their coke for this year are expected to start before long, but as yet they have not sent out inquiries. The Connellsville Courier reports the output of coke in the upper and lower Connellsville regions for the week ended February 27 to have been 274,935 tons, an increase over the previous week of 3845 tons. We quote standard makes of blast-furnace coke for prompt shipments from \$1.50 to \$1.60; on contracts for delivery up to July 1, \$1.65, and for delivery over all of 1915, at \$1.75 per net ton at oven. Standard makes of 72-hr. foundry coke are held at about \$2 for prompt shipment and from \$2.15 up on contracts.

**Old Material.**—Dealers are very firm in their views as to prices, some refusing to sell heavy steel scrap below \$12.50. Consumers, however, are unwilling to pay so much. The Carnegie Steel Company is out of the market as a buyer, and several other large consumers in this district are also covered and are therefore not interested at this time. No sales of moment were made in the past week. For delivery to consumers' mills in the Pittsburgh and other consuming districts that take Pittsburgh freights dealers quote as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	\$12.00 to \$12.50
Compressed side and end sheet scrap	10.25 to 10.50
No. 1 foundry cast	11.25 to 11.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to 12.00
No. 1 railroad malleable stock	10.00 to 10.25
Railroad grate bars	8.50 to 8.75
Low phosphorus melting stock	13.25 to 13.50
Iron car axles	18.75 to 19.25
Steel car axles	13.25 to 13.75
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	9.75 to 10.00
No. 2 busheling scrap	7.00 to 7.25
Machine shop turnings	7.50 to 7.75
Old carwheels	10.75 to 11.00
Cast-iron borings	8.00 to 8.25
Sheet bar crop ends	12.00 to 12.25
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	10.75 to 11.00
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	10.75 to 11.00

\*Shipping point.

## Chicago

CHICAGO, ILL., March 10, 1915.—(By Wire.)

The decision of the Illinois Central Railroad to bring in 35,000 tons of rails from Canada, some of which will go even to the Southern Division of its lines, has been the occasion for considerable dissatisfaction. It is maintained that the railroad did not feel warranted, under present conditions, in foregoing the opportunity of saving nearly \$3 a ton. It is also reported that an unwillingness on the part of some of the domestic mills to meet certain specification requirements was a consideration. Including the above, rail orders taken last week totaled approximately 60,000 tons. In other lines of steel products something of a lull has followed the period of active covering immediately preceding the advance in price. The American Bridge Company has taken a 7700-ton bridge contract for the Pacific Northwest, but other fabricated work has been of minor importance. Among car builders work is still very scarce, though the Haskell & Barker Car Mfg. Company is understood to have orders ahead for fully 5000 cars. There remains in the market inquiry for about 1200 cars and 95 locomotives. An interesting transaction in plates is the booking at Chicago of a tonnage for shipment to Japan by rail and ocean. The successful competition of Chicago for this business is made possible by the excep-

tional advance in ocean freights. The local pig-iron market is generally quiet to the point of making conspicuous any transactions involving 500 tons and over, though at the same time there is a very considerable inquiry for second half. For the remainder of the first half consumers seem able to secure prices which indicate eagerness among producers in securing the business.

**Pig Iron.**—Much the greater part of current inquiry in this market is for iron to be delivered in the last half. What can be done with respect to prices in connection with such inquiry appears to be dependent upon the amount of tonnage involved and the possibility of some shipments going forward in the second quarter. Recent transactions, in connection with which furnace competition was especially keen, have brought out prices as low as \$12.75 at Chicago furnace. Through quotations made on analysis iron the keenness with which some of the furnaces are seeking business is also portrayed. Prices as low as \$12.50, Chicago furnace, have been quoted for second quarter delivery on iron, which departs from standard malleable Bessemer specification only in its larger silicon contents. In recent competition for business in Lake irons, the Indiana Harbor furnaces continued to be an important factor. A somewhat larger tonnage of Southern iron was placed last week in outlying territory, but not without competition from high phosphorus brands of Northern iron and from combinations of iron of Northern and Southern analysis. Recent inquiry for charcoal iron indicates a very consistent adherence to schedule prices. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5	\$15.75
Lake Superior charcoal, No. 1	16.25
Lake Superior charcoal, No. 6 and Scotch	16.75
Northern coke foundry, No. 1	\$13.00 to 13.50
Northern coke foundry, No. 2	12.75 to 13.00
Northern coke foundry, No. 3	12.25 to 12.75
Southern coke, No. 1 f'dry and 1 soft	13.75 to 14.25
Southern coke, No. 2 f'dry and 2 soft	13.50 to 13.75
Malleable Bessemer	13.00 to 13.25
Standard Bessemer	15.50
Basic	12.50 to 13.00
Low phosphorus	20.00 to 20.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. silv'y, 10 per cent.	18.90 to 19.40

(By Mail)

**Rails and Track Supplies.**—The Illinois Central Railroad announces the closing of contracts on Wednesday of last week with the Algoma Steel Company for 35,000 tons of rails, the price being equivalent to \$27, f.o.b. Chicago. The negotiations were conducted at Chicago for the Algoma Steel Company by the Hyman-Michaels Company. The rails purchased cover requirements of the Illinois Central for trackage as far south as Memphis, Tenn. Other rail tonnage for which orders were received the past week included 11,000 tons from the New York Central Lines and totaled about 25,000 tons. The Great Northern Railroad has also closed for about 940 tons of tie plates, which it will receive by lake shipment. Of the 6000 tons of rails placed by the Burlington, a week ago, the Cambria Steel Company and Pennsylvania Steel Company each took 1000 tons, the remainder going to the local mill. We quote standard railroad spikes at 1.50c. to 1.60c., base; track bolts with square nuts, 1.90c. to 2c., base, all in carload lots, Chicago; tie plates, \$23.50 to \$25, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.07c.; 16 to 20 lb., 1.12c.; 12 lb., 1.17c.; 8 lb., 1.22c.; angle bars, 1.50c., Chicago.

**Structural Material.**—The closing of the contract for the spans of the Interstate bridge at Portland, Ore., resulted in an award of 7700 tons to the American Bridge Company, which company will also furnish 205 tons for a trestle for the M. A. Hanna Coal Company at Superior, Wis. Other contracts of from 100 to 200 tons, including that for the Union Bank building at Chicago, placed with the Vierling Steel Company, aggregated 460 tons. The Burlington has completed its car buying, involving the placing of 1750 cars, of which the larger part was reported last week. This road is also in the market for 50 locomotives. The Missouri, Kansas &



Texas inquiry, previously mentioned, still appears to be unplaced. For recent car business, the Haskell & Barker Car Mfg. Company has been a consistently successful bidder and it is now reported to have orders for 5000 cars on its books. Plain material tonnage is limited almost entirely to specifications, and there is very little new business to be had at the higher prices. We quote for Chicago delivery of plain shapes from mill 1.339c.

Local jobbers report a noticeable improvement in the demand for structural material out of store, both in tonnage and number of orders. We quote for Chicago delivery of structural material out of stock 1.75c.

**Plates.**—Plate tonnage for shipment to regular users in tributary territory is spread out very thin. An interesting development, attributable to the high ocean freight rates, appears in connection with the placing at Chicago of a round tonnage of plates for Japan delivery, for shipment via San Francisco. Some small lots of plates were booked during the week, and it is understood that the 1.15c. price was maintained. There is, however, very little occasion for a real test of this quotation. We quote for Chicago delivery of plates from mill 1.339c.

The demand for plates out of stock is the analogue of mill business in its meagerness. We quote for Chicago delivery of plates from stock 1.75c.

**Sheets.**—Galvanized sheets from Chicago mills, when they can be had at all, are being sold on the basis of 3.40c., Pittsburgh. For the most part the mills are out of the market on this product, providing only for the pressing needs of their customers. A fair business has been taken in the heavier gauges, but black sheets are subject only to limited demand. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.489c. to 1.539c.; No. 28 black, 1.939c. to 1.989c.; No. 28 galvanized, 3.589c.

We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.65c. to 3.75c.

**Bars.**—Bar-iron tonnage continues to move with more freedom and the market is in a much more stable and satisfactory condition from the standpoint of the makers. The principal business is going on the basis of 1.10c., Chicago, and bookings at 1.12½c. are not-out of line. Steel bars are coming in only in the form of specifications, new business being exceptionally scant. There is some improvement in the volume of hard steel-bar orders, but prices continue equivalent to 1.20c., Chicago. Manufacturers of motor trucks in this district who have been among those to take orders for export have been the source of a number of attractive tonnages of bars. We quote for mill shipments as follows: Bar iron, 1.10c.; soft steel bars, 1.289c. to 1.339c.; hard steel bars, 1.20c.; shafting in carloads, 65 to 68 per cent. off; less than carloads, 60 to 65 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 62 per cent. off.

**Rivets and Bolts.**—With the majority of bolt and nut users now under contract, activity is for the most part confined to securing specifications, to which end the recent advance in prices contributes. Our quotations are as follows: Carriage bolts up to ¾ x 6 in., rolled thread, 80-20; cut thread, 80-15; larger sizes, 80; machine bolts up to ¾ x 4 in., rolled thread, 80-25; cut thread, 80-20; larger sizes, 80-5; coach screws, 85.5; hot pressed nuts, square, \$6.80 to \$6.60 off per cwt.; hexagon, \$7.80 to \$7.60 off per cwt. Structural rivets, ¾ to 1½ in., 1.50c. to 1.55c., base, Chicago, in carload lots; boiler rivets, 10c., additional.

We quote out of store: Structural rivets, 2c.; boiler rivets, 2.10c.; machine bolts up to ¾ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ¾ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, \$6, and hexagon, \$6.70 off per cwt.

**Wire Products.**—An especially heavy tonnage having been booked in February, this seems to have moderated somewhat the volume of business appearing thus far in the present month. The movement of wire nails, fencing and barb wire, however, continues at a normal rate

for the season. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, \$1.589; wire nails, \$1.789; painted barb wire, \$1.789; galvanized barb wire, \$2.289; polished staples, \$1.789; galvanized staples, \$2.289, all Chicago.

**Cast-Iron Pipe.**—Awards of 2500 tons of pipe in Akron, Ohio, and 1200 tons at Duluth are yet to be made. At Ft. Wayne, Ind., the leading interest took 300 tons. New business in prospect totals something over the 2500-ton mark and includes 900 tons for St. Louis, 600 tons for Holton, Kan., 300 tons for Burton, Kan., 460 tons for Orion, Mich., and 250 tons for Mason City, Iowa. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$25.50; 6 to 12 in., \$23.50; 16 in. and up, \$23, with \$1 extra for gas pipe.

**Old Material.**—The continued lack of demand for scrap from consumers is overcasting the local market with an apathy not altogether reflected in quotations. There is practically no demand for rolling-mill grades, and the situation has also quieted down with respect to steel scrap. The position is such, however, that any resumption of buying on the part of consumers will at once result in appreciably strengthened prices. The feature of the listing of railroad scrap for sale is the offer of approximately 7500 tons of steel rails and about 1000 tons of iron rails by the Northern Pacific, whose list calls for a total of 8975 tons. The Lake Erie & Western offers 600 tons and the Soo Line 250 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$12.00 to \$12.25
Old steel rails, rerolling	10.25 to 10.75
Old steel rails, less than 3 ft.	10.25 to 10.50
Old carwheels	10.00 to 10.50
Heavy melting steel scrap	9.75 to 10.00
Frogs, switches and guards, cut apart	9.75 to 10.00
Shoveling steel	9.25 to 9.50
Steel axle turnings	7.25 to 7.50

Per Net Ton	
Iron angles and splice bars	\$11.50 to \$12.00
Iron arch bars and transoms	11.75 to 12.25
Steel angle bars	8.50 to 9.00
Iron car axles	13.75 to 14.25
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	9.00 to 9.50
No. 2 railroad wrought	8.50 to 9.00
Cut forge	8.50 to 9.00
Steel knuckles and couplers	8.75 to 9.00
Steel springs	9.25 to 9.75
Locomotive tires, smooth	8.50 to 9.00
Machine shop turnings	5.50 to 6.00
Cast borings	4.75 to 5.25
No. 1 busheling	8.00 to 8.50
No. 2 busheling	7.00 to 7.25
No. 1 boilers, cut to sheets and rings	5.50 to 6.00
Boiler punchings	8.25 to 8.50
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	8.25 to 8.50
Grate bars	8.00 to 8.25
Railroad malleable	8.00 to 8.25
Agricultural malleable	7.25 to 7.50
Pipes and flues	7.00 to 7.50

## Philadelphia

PHILADELPHIA, PA., March 9, 1915.

In the demand on steel companies much variance is apparent. With those that supply railroad track materials and can draw on the shipyards for business, conditions continue to improve, but with others whose products cover a more restricted range, activity does not show much, if any, improvement. That there has been more liberal buying by railroads is certain, but before demand can assume larger proportions evenly, they must buy more locomotives and cars. While plates, shapes and bars are generally quoted at 1.309c., Philadelphia, it is noticeable that consumers strive hard to get a lower price and instances have come out, particularly in plates, where concessions have been made. An eastern Pennsylvania mill has sold 7500 tons of steel crop-ends for export to Italy and reports that its forging department is enjoying good business. Another mill has supplied several thousand tons of steel for shrapnel-making and is continuing to ship large quantities of barb wire to Europe. The pig-iron demand is light, on the whole, but inquiries for small lots for prompt delivery are numerous. Low phosphorus is not so freely taken, some deliveries having been postponed; at the same time some has been sold for export. Sheets are weak, and the billet trade continues



dull. In old material more interest is shown and some prices are a little higher.

**Iron Ore.**—New business continues stagnant. Imports at this port in the week ended March 6 were 6450 tons from Cuba, 7000 tons from Chile and 6410 tons from Sweden.

**Pig Iron.**—New business continues light, but the extent to which deliveries against contracts are taken is considered a cause of encouragement. Except in the case of low phosphorus, practically no instances are heard where shipments have been held up. Low phosphorus makers are slowly accumulating stock at their furnaces, the domestic demand coupled with sales for export not having been sufficient to absorb the output. In the week a few hundred tons were sold for shipment to Italy via New York. Another encouraging symptom of the market is the considerable number of inquiries for small lots, mostly carloads, where the buyers insist that delivery be made quickly, although the aggregate of these small inquiries and resultant sales was not great enough to make the week's business equal to that of the preceding one. In them, however, sellers see a healthier tone. The Southern Railway has an inquiry out for 150 tons of gray forge, 150 tons of foundry running 1.50 per cent. and over in silicon; 200 tons running 2 per cent. and over, and 75 tons running 2.50 per cent. and over. Of the more attractive inquiries before the market one calls for 400 tons of miscellaneous grades, another for 300 tons of charcoal iron and another for 200 tons of No. 2 X. A few hundred tons of No. 2 Southern iron have been sold for delivery in June on the basis of \$9.50, Birmingham. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X foundry.....	\$14.25 to \$14.50
Eastern Penna. No. 2 plain.....	14.00 to 14.25
Virginia No. 2 X foundry.....	15.25
Virginia No. 2 plain.....	15.00
Gray forge .....	13.25 to 13.50
Basic .....	13.50
Standard low phosphorus .....	20.00 to 20.50

**Ferroalloys.**—The market continues to be characterized by a lack of definite news both as to supply and prices. The new quotation is \$78, Baltimore. While none is known to be afloat, the general understanding is that the British Government will soon permit each of the English producers to ship 500 tons per month to this country. All sailings will probably be from Liverpool, as it is not believed that any chances will be taken in the North Sea or English Channel. A local seller is offering domestic ferromanganese, but declines to say where the product is made or to give quotations for publication. Small quantities are still commanding a high premium. A local company having a furnace at Dunbar, Pa., has sold all of its 40 per cent. material and some 30 to 35 per cent., and is now engaged in the production of manganese pig iron ranging from 1½ to 5 per cent. of manganese and is finding a good demand. It is adding to the price of its iron, except for the first 1 per cent., 75c. for each additional 1 per cent. of manganese, or 37½c. for each ½ of 1 per cent. While this quality of iron is advantageous in the making of steel and steel castings it does not make the use of ferromanganese unnecessary. Ferrosilicon is quoted at \$71 to \$73, Pittsburgh.

**Bars.**—New demand is principally for twisted steel bars, with most of the inquiries rather small. For ordinary steel bars specifications against contracts are considered fair. The bridge over Broad street, Philadelphia, requiring about 400 tons of reinforcing bars, went to the Arthur McMullen Company, New York. A proposition soon to come out involves a large tonnage for the bridge of the Cumberland Valley Railroad over the Susquehanna River at Harrisburg. The Western Maryland Railroad is in the market for about 100 tons of miscellaneous steel bars. The Philadelphia quotation is 1.309c., although in some cases where competition was sharp this price has been shaded. Iron bars are unchanged at 1.15c. to 1.20c., delivered.

**Plates.**—While 1.309c., Philadelphia, is stated generally as the quotation for March delivery, the zeal to get business has unquestionably led to some recessions from this price. The Government has been in the market for 225 tons of plates, all of one size, for shipment to Panama and it is believed that less than the

generally-quoted price was named. On the whole, specifications of the week were a little better. The railroads have increased their buying of cars and locomotives little, if at all, but excellent reports continue to come from the shipyards. The William Cramp & Sons Ship & Engine Building Company has received an order to build one boat for W. R. Grace & Co. The New York Shipbuilding Company, Camden, has received an order from the Standard Oil Company for two 468-ft. oil tank steamers and also two colliers for the Coastwise Transportation Company, Boston, for delivery within 22 months. The Pusey & Jones Company, Wilmington, Del., has been awarded a contract for the construction of two oil-engine propelled vessels for the Government. Each boat is to be 110 ft. 10 in. over all and is to be used on the Atlantic coast.

**Steel Rails.**—Some moderate-sized orders are near a close; in fact, one or two have been verbally placed, but definite announcements of the business have not yet been made. With local mills about 15,000 tons are pending. The commissioners of the port of Jacksonville are scheduled to open bids March 10 for 660 tons of 70-lb. rails, together with bolts, nuts, splices, spikes, etc. There is an inquiry in this market for 600 tons of spikes for shipment to Russia, and according to some reports the quantity to be purchased is much larger.

**Structural Material.**—A little more inquiry is reported, but not enough to raise the spirits of local mill representatives to any great extent. On a building requiring 700 tons for the Scranton Life Insurance Company, Scranton, Pa., the Ferguson Steel & Iron Company, Buffalo, N. Y., was the successful bidder. It is reported that the Pennsylvania Railroad has placed 1100 tons of bridge and viaduct material with the Pennsylvania Steel Company and 425 tons with the McClintic-Marshall Company. For the Pennsylvania Railroad station at Elizabeth, N. J., it is said that the Pennsylvania Steel Company will furnish 450 tons. For a bridge over the Mullica River, Chestnut Neck, N. J., on which bids went in March 3, involving a few hundred tons of sheet piling and small tonnage of reinforcing bars, Edward Fay & Sons, Philadelphia, were the low bidders. The market is unchanged at 1.309c., Philadelphia.

**Sheets.**—While Eastern makers are striving to obtain 1.45c. to 1.50c., Philadelphia, for No. 10 blue annealed sheets, Western makers have cut these prices and the situation is declared to be most unsatisfactory. Demand is mostly for small lots and does not run far ahead.

**Billets.**—The market is unchanged at \$21.52 for basic open-hearth rolling billets delivered here. The demand is dull. Forging steel billets are quoted about \$4 higher than rolling steel.

**Coke.**—Interest is almost entirely absent and no revival is expected until about the middle of the year when the making of contracts will come up again. For prompt shipment, standard Connellsville furnace coke is quoted at \$1.50 to \$1.55 per net ton at oven and foundry coke at \$2 to \$2.25. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

**Old Material.**—Heavy melting steel scrap is now quoted at \$10.50 to \$11 and a sale has been made at the latter price. Demand is a little better, but so far actual transactions have not been greatly increased. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$10.50 to \$11.00
Old steel rails, rerolling.....	10.50 to 11.00
Low phos. heavy melting steel scrap..	14.25 to 14.50
Old steel axles .....	14.00 to 14.50
Old iron axles .....	17.50 to 18.00
Old iron rails .....	13.00 to 14.00
Old carwheels .....	11.00 to 11.50
No. 1 railroad wrought .....	12.50 to 13.00
Wrought-iron pipe .....	10.00 to 10.50
No. 1 forge fire .....	8.00 to 8.50
Bundled sheets .....	8.00 to 8.50
No. 2 busheling .....	7.75 to 8.25
Machine shop turnings .....	8.00 to 8.50
Cast borings .....	8.00 to 8.50
No. 1 cast .....	12.00 to 12.50
Grate bars, railroad .....	8.75 to 9.25
Stove plate .....	8.75 to 9.25
Railroad malleable .....	9.00 to 9.50

## Cleveland

CLEVELAND, OHIO, March 9, 1915.

**Iron Ore.**—A number of reservations of Lake Superior ore have been made in the past few days. They will be written into contracts as soon as the season's prices are established. February shipments from Lake Erie docks were 301,629 tons, as compared with 249,123 tons in January and 429,649 tons in February, 1914. Dock shipments have improved in the past week and the March movement will be considerably heavier than in February. On March 1 there was 7,509,587 tons of ore on docks, as compared with 7,743,290 tons March 1, 1914. We repeat 1914 prices as follows: Old range Bessemer, \$3.75; Mesaba Bessemer, \$3.50; old range non-Bessemer, \$3; Mesaba non-Bessemer, \$2.85.

**Pig Iron.**—A more active demand for foundry iron is reported in Indiana and western Ohio and some very keen competition with low prices has resulted on inquiries from points reached by Toledo, Chicago and Ironton furnaces. The sales are being made for either the third quarter or the last half. An Evansville, Ind., consumer which had an inquiry out for 900 tons of foundry iron is reported to have bought from a Chicago furnace. In this market shipments are good, being practically up to the present production, but there is no new demand. A Cleveland seller has taken 800 tons of Southern charcoal iron in three lots for shipment to the Pittsburgh district. Prices on Northern iron are unchanged at \$12.75 Cleveland for No. 2 for outside shipment. Southern iron is quoted at \$9.50, Birmingham, for No. 2 for delivery until July, and \$9.75 for the last half. There is no buying at the advance for future delivery, but a \$9.50 price for the last half would doubtless bring out some business. We quote, delivered Cleveland, as follows:

Bessemer .....	\$14.55
Basic .....	13.45
Northern No. 2 foundry .....	13.50
Southern No. 2 foundry .....	13.50
Gray forge .....	13.00
Jackson Co. silvery, 8 per cent. silicon .....	\$16.62 to 17.12
Standard low phos. at furnace .....	19.75 to 20.00

**Coke.**—The market is dull and prices on furnace grades are not firm. Standard blast furnace coke is being offered at \$1.45 per net ton at oven for prompt shipment. Several producers are asking \$1.55 to \$1.60. We quote standard makes of 72-hr. Connellsville foundry coke at \$2.25 to \$2.50.

**Finished Iron and Steel.**—Specifications are fair and some new business is coming out at the new price of 1.15c., Pittsburgh, for steel bars, plates and structural material, which so far are being generally maintained. A marked improvement is noted in the demand for plates, owing to the fact that Ohio tank shops are getting busy on oil tank work. The lake ship building industry is beginning to show some life, the first inquiries of the season having come out for ore boats. These inquiries are for two freighters that will take about 6500 tons of plates and structural material. There is an inquiry for 700 tons of steel for shrapnel cases for shipment to England. It is announced that the order for the shells has been definitely placed in this city. There are also other tentative inquiries for round lots of steel for the same purpose. Little new inquiry has developed in structural lines. The Fort Pitt Bridge Works has taken 215 tons for the factory building of the Elyria Iron & Steel Company in Cleveland, and the Lake Shore has taken bids for 200 tons for a bridge in Toledo. The floating crane for the United States Navy Yard at Norfolk, Va., for which the Wellman-Seaver-Morgan Company is the low bidder, will require 600 tons of steel. Ohio fabricators are bidding on an 1100-ton inquiry from the Chicago, Burlington & Quincy for bridge work. The Cleveland Railway Company has purchased 1500 tons of rails, 1000 tons going to the Lackawanna Steel Company and 500 tons to the Lorain Steel Company. Weakness has developed in black sheets, which are being offered as low as 1.70c., Ohio mill, for No. 28. Mill quotations on galvanized sheets are unchanged at 3.40c. to 3.50c. for No. 28, but business is going to jobbers at lower prices. Bar iron is dull with prices unchanged at 1.10c., Cleveland, for outside ship-

ment. Local bar iron mills are running at about 30 per cent. of capacity. Warehouse prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

**Bolts, Nuts and Rivets.**—The bolt and nut market is firm and specifications have improved somewhat. Rivet prices are unchanged at 1.45c. to 1.50c. Pittsburgh for structural, and 1.55c. to 1.60c. for boiler. Bolt and nut discounts are as follows: Common carriage bolts,  $\frac{1}{2}$  x 6 in., smaller or shorter, rolled thread, 80 and 20 per cent.; cut thread, 80 and 15 per cent.; larger or longer, 80 per cent.; machine bolts with h.p. nuts,  $\frac{1}{2}$  x 4 in., smaller or shorter, rolled thread, 85 per cent.; cut thread, 80 and 20 per cent.; larger or longer, 80 and 5 per cent.; coach and lag screws, 85 and 5 per cent.; square h.p. nuts, blank or tapped, \$6.50 off; hexagon h.p. nuts, blank or tapped, \$7.40 off; c.p.c. and t. square nuts, blank or tapped, \$6.20 off; hexagon  $\frac{1}{2}$  in. and larger, \$7.50 and \$7.75 off; 9/16 in. and smaller, \$8 and \$8.25 off; semi-finished hexagon nuts,  $\frac{1}{2}$  in. and larger, 85, 10, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 10 per cent.

**Old Material.**—The scrap market is fairly active and firm. Valley mills continue to buy material and the local demand has improved. Dealers are holding for higher prices and generally are unwilling to sell except in small lots at the present quotations. Most of the large tonnage of railroad scrap sold last week is understood to have gone direct to the mills at good prices. A large share of the Lake Shore scrap was sold to consumers under a trade arrangement. Valley prices on heavy melting steel have advanced to \$11.50 to \$11.75. In the Cleveland market several grades have been advanced. We quote f.o.b. Cleveland as follows:

Per Gross Ton	
Old steel rails, rerolling .....	\$11.00 to \$11.75
Old iron rails .....	12.00
Steel car axles .....	13.25 to 13.50
Heavy melting steel .....	10.25 to 10.50
Old carwheels .....	10.25 to 10.75
Relaying rails, 50 lb. and over .....	22.50
Agricultural malleable .....	8.00 to 8.50
Railroad malleable .....	10.25 to 10.50
Light bundled sheet scrap .....	8.00 to 8.50

Per Net Ton	
Iron car axles .....	\$16.00 to \$16.50
Cast borings .....	6.25 to 6.50
Iron and steel turnings and drillings .....	5.75 to 6.00
Steel axle turnings .....	6.50 to 7.00
No. 1 busheling new .....	8.75 to 9.00
No. 1 busheling old .....	8.50 to 8.75
No. 1 railroad wrought .....	10.00 to 10.25
No. 1 cast .....	10.00 to 10.50
Stove plate .....	8.25 to 8.50

## Cincinnati

CINCINNATI, OHIO, March 10, 1915.—(By Wire.)

**Pig Iron.**—The market lacks snap. Few inquiries are out and there is a comparatively small amount of business being transacted under cover. Only a few of the Southern furnaces have opened their books for the last half, the majority of them not being willing to take business that far ahead. However, some Southern No. 2 foundry iron can be contracted for at \$9.50, Birmingham basis, for strictly last half shipment. Even this has not stirred up much interest among consumers. A well authenticated report is in circulation to the effect that some Southern No. 2 foundry has been sold for prompt shipment below \$9.50, Birmingham, although it is understood that this was a special lot on which the seller wished to realize quick cash. A consumer at Columbus, Ohio, bought last week 2000 tons of malleable from a Columbus furnace. For prompt shipment through the third quarter a local foundry has contracted for approximately 1000 tons of mixed Northern and Southern grades. The two Indiana inquiries mentioned last week have been closed, but in both cases the tonnage bought was below the amount called for. The melt of foundry iron is increasing slowly and shipments are going forward on contracts at a satisfactory rate. A local consumer expects to close for 500 tons of Southern iron within the next few days. The leading cast-iron pipe interest has an inquiry out for a lot of iron for its Addyston plant. More interest is being taken in basic and there is also an inquiry from northern Ohio for a round tonnage of malleable. Based on freight rates of \$2.90 from Birm-



ingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$12.90 to \$13.40
Southern coke, No. 2 f'dry and 2 soft.	12.40 to 12.90
Southern coke, No. 3 foundry.	11.90 to 12.40
Southern No. 4 foundry.	11.40 to 11.90
Southern gray forge	10.90 to 11.40
Ohio silvery, 8 per cent. silicon.	16.26 to 16.51
Southern Ohio coke, No. 1.	15.01 to 15.51
Southern Ohio coke, No. 2.	14.01 to 14.51
Southern Ohio coke, No. 3.	13.76 to 14.01
Southern Ohio malleable Bessemer.	14.26
Basic, Northern	14.26
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel.	26.90 to 27.40

(By Mail)

**Coke.**—Shipments against foundry coke contracts are going forward at a satisfactory rate, indicating that some of the jobbing foundries are working almost up to capacity. No new contracting is looked for until well along in April when the foundries are expected to cover for future needs. The furnace coke situation is unchanged. Furnace coke is stationary around \$1.50 to \$1.75 per net ton at oven in all three fields, and foundry coke at \$2 to \$2.50.

**Finished Material.**—The mills in this vicinity report a fair amount of business in both black and galvanized sheets, but orders are only being booked for prompt shipment. No. 28 black sheets are quoted at 1.90c., Pittsburgh, and No. 28 galvanized at 3.40c. Should spelter continue to advance, the mills will be forced to raise their quotations another notch. Mill agencies report a noticeable improvement in steel bars and plates; while contracting has been confined mostly to small lots, considerable business is in sight that will be closed this spring. Local store prices on steel bars and small structural shapes remain at 1.80c. to 1.85c. Hoops and bands are quiet.

**Old Material.**—Dealers report a better demand from outside territory, especially in the East and in the Chicago district, than from nearby customers. As the rolling mills are not now buying any old material, the principal demand is from the jobbing foundries, and while they are purchasing about the usual quantity for this season, the total tonnage is not sufficiently large to have any effect on prices. In fact, it is known that considerable scrap can be bought below market prices when firm offers are submitted. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton		
Bundled sheet scrap	\$6.75 to	\$7.25
Old iron rails	11.00 to	12.00
Relaying rails, 50 lb. and up.	19.75 to	20.25
Rerolling steel rails	9.75 to	10.25
Melting steel rails	9.00 to	9.50
Heavy melting steel scrap	9.00 to	9.50
Per Net Ton		
No. 1 railroad wrought.	\$8.50 to	\$9.00
Cast borings	4.50 to	5.00
Steel turnings	4.50 to	5.00
Railroad cast scrap	9.50 to	10.00
No. 1 machinery cast scrap.	10.25 to	10.75
Burnt scrap	6.50 to	7.00
Old iron axles	14.00 to	14.50
Locomotive tires (smooth inside)	9.00 to	9.50
Pipes and flues	6.00 to	6.50
Malleable and steel scrap.	7.00 to	7.50
Railroad tank and sheet scrap.	5.00 to	5.50

## Buffalo

BUFFALO, N. Y., March 9, 1915.

**Pig Iron.**—The market lacks life. One producer, however, reports a few large orders, including one of 450 and one of 600 tons of 2 X foundry. A few melters of the district are quite active, but the general run of foundries have less business than for the past several weeks. Specifications on contracts show a considerable falling off, although a fairly good aggregate tonnage continues to go out daily from the furnaces. The recession in price schedules noted last week is still in effect with no further reductions in evidence, \$12.75 to \$13 at furnace ruling for No. 2 foundry and malleable with lower silicon irons proportionately lower. One of the producing interests of the district, however, claims to be declining to accept business at the lower level prices. We quote as follows, f.o.b. furnace, for first half delivery:

No. 1 foundry	\$13.00 to \$13.25
No. 2 X foundry	12.75 to 13.00
No. 2 plain	12.50 to 12.50
No. 3 foundry	12.25 to 12.50
Gray forge	12.25 to 12.50
Malleable	12.75 to 13.00
Basic	13.50 to 13.75
Charcoal, regular grades and analysis.	*15.75 to 17.00

\*The minimum applying only to direct shipments from furnace instead of from storage yards or docks at Buffalo.

**Finished Iron and Steel.**—Sellers are holding firmly to the 1.15c. price established March 1, and there are no indications in this market of price weakness. Specifications are coming in at about the same rate as a week ago. Iron bars have advanced \$1 per ton, effective March 8. Steel pipe shows fair demand, the February 2 card holding on new business. Falk & Menzies, this city, who have Erie Barge Canal contract F, covering work at Seneca Falls, are subletting 67,000 lb. of reinforcing steel and 30,000 lb. of other steel. They have given 375 tons of structural steel to the Massillon Bridge & Iron Works, Massillon, Ohio. The Ferro Concrete Construction Company, Cincinnati, has the contract for the Howe-Rogers building, Rochester, requiring considerable reinforcing and some structural steel. The Ferguson Steel & Iron Company, this city, has 700 tons for the Scranton Life Insurance Company, Scranton, Pa. F. L. Heughes & Co., Rochester, have 150 tons for a building for William H. Saur, that city.

**Old Material.**—The market holds strong in all lines this week, although the principal mill using heavy melting steel is still out of the market. Considerable business has been done, but chiefly for shipment to points outside of the district. Dealers are holding firmly to present prices, expecting conditions will develop that will warrant an increase within a short time. This applies especially to heavy melting steel. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$10.50 to \$10.75
Low phosphorus steel.	13.00 to 13.50
No. 1 railroad wrought scrap.	10.00 to 10.50
No. 1 railroad and machinery cast.	10.50 to 11.00
Old steel axles	12.00 to 12.50
Old iron axles	16.00 to 16.50
Old carwheels	10.50 to 11.00
Railroad malleable	9.50 to 10.00
Machine shop turnings	5.75 to 6.25
Heavy axle turnings	8.50 to 9.00
Clean cast borings	6.50 to 7.00
Old iron rails	11.00 to 11.50
Locomotive grate bars	9.00 to 9.50
Stove plate (net ton)	8.25 to 8.75
Wrought pipe	6.50 to 7.00
Bundled sheet scrap	7.25 to 7.75
No. 1 busheling scrap	8.00 to 8.50
No. 2 busheling scrap.	5.50 to 6.00
Bundled tin scrap	10.00

## Birmingham

BIRMINGHAM, ALA., March 8, 1915.

**Pig Iron.**—The market continues to show activity, although nothing has occurred to justify any special optimism. Export sales of and inquiries for foundry iron are comparatively brisk. Engagements for shipment to Europe from Southern ports in the near future are reported as aggregating 75,000 tons of metal products, pig iron predominating. England has been the largest taker of pig iron. The past week's sales have been largely in local territory and for European delivery. The Sloss-Sheffield Steel & Iron Company is credited with having sold 60,000 tons of iron in February, the equivalent of a three months' average output, and, as the company has only two furnaces in blast, the new business will serve to rid the yards of heavy accumulations. Pipe makers have recently bought considerable iron. Prices continue to hover around \$9.50, with \$9.75 for small lots. If any has gone under the former figure, there is no evidence of it and strict denial is made in all quarters. Prices obtained for the foreign iron have been as high as and sometimes even above \$10. Interest continues to center in the foreign demand, and every agency is employed to secure ship room. There is still little disposition to sell strictly third quarter iron at prevailing prices, some makers holding for \$10, being inclined to believe that there is a chance to secure that price. Orders embracing second and third quarter delivery have been placed on the schedule now existing. The steel plant and rail mill of the Tennessee Company are operating to good



capacity and small orders for rails amount to a respectable aggregate. Large shipments of wire from the Fairfield plant of the American Steel & Wire Company have been made to destinations not given. Billets are moving abroad. The entire metal situation seems better than it was at the opening of the year, with a considerably improved prospect. We quote, per gross ton, f.o.b. Birmingham furnaces, as follows:

No. 1 foundry and soft.....	\$10.00 to \$10.25
No. 2 foundry and soft.....	9.50 to 9.75
No. 3 foundry .....	9.00 to 9.25
No. 4 foundry .....	8.75 to 9.00
Gray forge .....	8.50 to 8.75
Basic .....	9.50 to 10.00
Charcoal .....	22.50 to 23.00

**Cast-Iron Pipe.**—The water and gas pipe manufacturers are operating on a large scale, with order books well filled and the inquiry good. Birmingham factories have secured orders from Western and Southern points and many bids are being submitted. The tendency to a stricter maintenance of prices is reported. The soil pipe makers are operating about 60 per cent. of capacity, which is quite an improvement over January conditions, and orders are coming in more freely. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$20; 6-in. and upward, \$18, with \$1 added for gas pipe.

**Coal and Coke.**—The coal market is dull and prices are unsatisfactory. The tendency is to close some of the older and less profitable mines. The movement to ports on the Gulf is again on the increase. There is considerable inquiry for coke from the Pacific coast and Texas points. Orders placed for Mexico have been withdrawn, owing to the unsatisfactory conditions there. Coke is relatively stronger, with no advance in prices. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, \$2.75 to \$2.90; Foundry, \$3.25 to \$3.50.

**Old Material.**—Scrap is in slightly better demand, owing to an increase in consumers' operations. The demand is largely for light steel scrap. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles .....	\$13.00 to \$13.50
Old steel axles .....	12.50 to 13.00
Old iron rails .....	12.00 to 12.50
No. 1 railroad wrought.....	8.50 to 9.00
No. 2 railroad wrought.....	7.50 to 8.00
No. 1 country wrought.....	8.00 to 8.50
No. 2 country wrought.....	7.00 to 7.50
No. 1 machinery cast .....	9.50 to 10.00
No. 1 steel scrap .....	8.00 to 8.50
Tram carwheels .....	8.50 to 9.00
Stove plate .....	8.00 to 8.50

## St. Louis

ST. LOUIS, Mo., March 8, 1915.

**Pig Iron.**—Demand continues in small lots for immediate delivery and sales have aggregated not much over 2000 tons. One inquiry unfilled is for 500 tons of carwheel iron. Specifications on existing contracts are increasing, indicating that the melt is growing.

**Coke.**—Only carload lot business is appearing, but specifications on contracts are increasing. By-product coke, St. Louis delivery, is quoted at \$5.20.

**Finished Iron and Steel.**—Increasing demand is noted both on new business and under contracts. Ordinary bars are in better request and the new prices are held quite firmly, with a favorable reception on the part of the buyers. Sales of standard rails include 3000 tons to the Terminal Railroad Association and 1300 tons to the local street railway company. Some car orders are expected soon from one or two of the roads, but specifications are not yet out. Agricultural implement and vehicle interests are taking sparingly. Stock out of warehouse continues in active demand and is moving freely. Galvanized sheets have risen again. We quote for stock out of warehouse as follows: Soft steel bars, 1.70c.; iron bars, 1.65c.; structural material, 1.80c.; tank plates, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, cold rolled, 2.55c.; No. 28 galvanized sheets, black sheet gauge, 3.85c.

**Old Material.**—Dealers continue optimistic despite large quantities of material being offered by the railroads. Inquiries are increasing in number and size and dealers are inclined to maintain prices against a better future. Spring construction and repair work is helping the feeling and relaying rails are particularly strong.

Lists out and closing include 300 tons from the Mobile & Ohio, 400 tons from the Kansas City Southern, 4500 tons from the Big Four, 9000 tons from the Northern Pacific, 5000 tons from the Southern, 800 tons from the Vandalia, and 200 tons from a local industry. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton	
Old iron rails .....	\$10.50 to \$10.75
Old steel rails, re-rolling .....	10.25 to 10.50
Old steel rails, less than 3 feet.....	11.50 to 12.00
Relaying rails, standard section, subject to inspection .....	21.00 to 23.00
Old carwheels .....	10.25 to 10.50
No. 1 railroad heavy melting steel scrap .....	9.50 to 9.75
Shoveling steel .....	8.75 to 9.00
Frogs, switches and guards cut apart .....	9.75 to 10.00
Bundled sheet scrap .....	6.00 to 6.25

Per Net Ton	
Iron angle bars .....	\$10.75 to \$11.00
Steel angle bars .....	9.00 to 9.25
Iron car axles .....	15.00 to 15.50
Steel car axles .....	10.75 to 11.00
Wrought arch bars and transoms.....	11.25 to 11.50
No. 1 railroad wrought.....	8.25 to 8.50
No. 2 railroad wrought .....	8.00 to 8.25
Railroad springs .....	8.75 to 9.00
Steel couplers and knuckles.....	9.00 to 9.25
Locomotive tires, 42 in. and over, smooth inside .....	9.00 to 9.25
No. 1 dealers' forge .....	7.50 to 7.75
Mixed borings .....	5.25 to 5.50
No. 1 busheling .....	7.75 to 8.00
No. 1 boilers, cut to sheets and rings.....	6.25 to 6.50
No. 1 railroad cast scrap.....	9.50 to 10.00
Stove plate and light cast scrap.....	8.00 to 8.25
Railroad malleable .....	7.25 to 7.50
Agricultural malleable .....	6.75 to 7.00
Pipes and flues .....	6.25 to 6.50
Railroad sheet and tank scrap.....	6.25 to 6.50
Railroad grate bars .....	7.50 to 7.75
Machine shop turnings .....	5.75 to 6.00

## Boston

BOSTON, MASS., March 9, 1915.

**Old Material.**—Dealers report the market firm but unchanged as to prices. They look for a steady condition of demand, improving somewhat as the season advances. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel.....	\$8.25 to \$8.50
Low phosphorus steel .....	13.75 to 14.75
Old steel axles .....	12.75 to 13.25
Old iron axles .....	20.25 to 20.75
Mixed shafting .....	12.00 to 12.25
No. 1 steel wrought and soft steel.....	8.25 to 8.75
Skeleton (bundled) .....	5.50 to 5.75
Wrought-iron pipe .....	7.00 to 7.50
Cotton ties (bundled) .....	5.25 to 5.75
No. 2 light .....	3.25 to 3.75
Wrought turnings .....	5.00 to 5.50
Cast borings .....	5.00 to 5.25
Malleable .....	7.50 to 7.75
Stove plate .....	7.00 to 7.50
Grate bars .....	5.25 to 5.50
Machinery cast (price to consumers).....	11.25 to 11.50

## New York

NEW YORK, March 10, 1915.

**Pig Iron.**—Improvement in foundry operations has not been enough to make any appreciable change in the status of the merchant furnace industry in eastern Pennsylvania, as Buffalo furnaces, while not uncomfortable competitors in the Philadelphia district and elsewhere in eastern Pennsylvania, as they were some weeks ago, are still making prices which command what business appears in New England. Export demand for steel-making iron is more talked about in New York than anything developing from Eastern foundries. For shipment to Italy 500 tons of low phosphorus iron has been sold in the past week, following several similar lots of standard Bessemer iron, though Italy's recent purchases of crop ends have exceeded her pig iron buying. A pump company has been in the market for a few hundred tons and several lots of second-half delivery have come up in New York State, but generally the situation is very quiet. The Eastern Pig Iron Association's figures brought together at a recent meeting showed practically no change in the past month in stocks and in unfilled orders. We quote as follows at

tidewater: No. 1 foundry, \$14.50 to \$15; No. 2 X, \$14.25 to \$14.50; No. 2 plain, \$14 to \$14.25; Southern, \$14.50 for No. 1 and \$14 to \$14.25 for No. 2.

**Ferroalloys.**—Representatives here of British producers of ferromanganese lack definite information as to what may be expected in shipments from England. Reports of license from the government to ship 500 tons or more per month by each of the five or six British producers are not absolutely confirmed, and no notice of sailings is at hand yet. One representative has been cabled that 500 tons may be shipped for the present, but the extent to which the situation may be relieved is not at all clear. The general feeling is that authority to ship awaits definite shipping arrangements, but when these can be obtained and how much alloy will come is uncertain; but it is certain that 2500 tons per month is much below our average monthly consumption of imported metal. Opinions are advanced that the continued failure of negotiations for supplies is attributable to political and diplomatic uncertainties involved in our present rather delicate relations with England regarding cotton and other commodities, the intimation even being made that in case of trouble our supplies of British ferromanganese will be entirely withheld. After having withdrawn from the market a week ago the British producers now announce a quotation of \$78, seaboard, for shipment, when obtainable, on new contracts. Most consumers who still hold unfilled contracts made at \$38, seaboard, find that the securing of further supplies involves arranging for an equal tonnage at \$78, seaboard. If limited shipments are resumed it is expected that the material will be delivered on merged contracts recently made at \$68 seaboard. In the meantime anxiety among various consumers does not lessen. It is stated, but not officially confirmed, that a Niagara Falls, N. Y., interest is making 80 per cent. ferromanganese electrolytically from Brazilian manganese ores and selling it at \$100 per ton at works. Normal sales of 50 per cent. ferrosilicon are being made at the current quotation of \$71 to \$73, Pittsburgh.

**Structural Material.**—While activity is noteworthy, as is to be expected at this season, it is confined largely to private and public buildings. Outside of the Pennsylvania Railroad, offerings from the transportation lines are scarce. The lettings of the week for this territory aggregate about 20,000 tons, but fabrication and erection prices are very low, so low, in fact, that it is felt they ought to attract heavy investments in buildings, even if the immediate future would not promise profitable occupation of the buildings. Siberia has bought structural material and inquiry is received from Brazil. Standard American shapes nearest the metric dimensions are accepted. Of work still open there are about 17,000 tons, with considerable yet to come on the market as soon as financial arrangements are consummated. Of work which has been closed mention may be made of the following: Third tracking Brooklyn elevated lines, 7500 tons, to Lewis F. Shoemaker & Co.; Ocean Steamship Company pier at Savannah, Ga., 3500 tons, to the Virginia Bridge & Iron Company; Pennsylvania Railroad, 1600 tons at Camden, Dunlop and South Elizabeth, to the Pennsylvania Steel Company, and 400 tons at Titusville to the McClintic-Marshall Company; an insurance building, Scranton, Pa., 700 tons, to the Ferguson Steel & Iron Company, Buffalo, N. Y.; public school No. 48, Bronx, 600 tons, to the Phoenix Bridge Company, which has also taken 1900 tons for three Y.M.C.A. buildings, one at Lexington avenue and Fifty-third street, one on Forty-fifth street east of Lexington avenue, and one at 124th street and Lenox avenue, as well as 125 tons for additions to Washington market; Connolly office building, Atlanta, Ga., 600 tons, to the Levering & Garrigues Company; Remington Arms Company, Bridgeport, 1400 tons, probably to the Berlin Construction Company; grain elevator, Baltimore, for the Western Maryland, 250 tons, to the McClintic-Marshall Company, and a torpedo station at Newport, R. I., 1000 tons, which will probably go to the Phoenix Bridge Company, which bid 2.34c. per lb. erected, the work to be done in 10 weeks. Early settlement of the following pending projects is expected: 800 tons for

the D. & M. Realty Company, 116 East Twenty-seventh street; 1800 tons for the Brokaw building, Forty-second street and Broadway, and 3000 tons for the loft building on the site of the Hoffman House. Other new projects include 1700 tons for the Ayer building, Twenty-sixth street and Broadway; 500 tons for the Palmer apartments, Riverside Drive and Ninety-sixth street; 600 tons for the Chelsea warehouse, 120 West 107th street; 500 tons for the Surrey apartments, 114 East Eighty-fourth street; 400 tons for a machine shop for the Robins Dry Dock & Repair Company. The Harris Silvers Baker Company has sublet 200 tons of girders for the Isaac A. Hopper building to the McClintic-Marshall Company and 350 tons of columns to the Hedden Iron Construction Company. We quote mill shipments at 1.15c., Pittsburgh, or 1.319c., New York, and from store, 1.85c. to 1.90c., New York.

**Plates.**—The prospects for railroad car building have dimmed perceptibly, and the total before the market is about 1500 cars, though if all tangible inquiries are included, about 2500. The boat building on the Atlantic seaboard is helping and some plates are of course involved in the larger structural projects. Plate mills are able to keep at recent rates of operation, but quotations remain at 1.10c. Pittsburgh, except in less than carload lots, when 1.15c. is asked. The Boston & Maine has closed for 1200 so-called center constructions for delivery over one year, half with the Laconia Car Company and half with the Bradley Car Company, this dispensing with the earlier proposition to buy 3000 center constructions for a more extended delivery. The Burlington has placed the 200 gondola cars also with the Haskell & Barker Car Company. The Missouri, Kansas & Texas may buy 1000 freight cars and 200 general service cars; the Santa Fe is still considering 500 refrigerator cars and there is some likelihood that the Illinois Central will purchase 100 gondolas. The New York, Westchester & Boston is in the market for 15 cars. We quote steel plates at 1.10c. to 1.15c., Pittsburgh, or 1.269c. to 1.319c., New York, and from store, 1.85c. to 1.90c., New York. Robert Hall & Son were low bidders at \$6520 for 20 tanks for the Army at the Philippine Islands, and the highest of 18 bids was \$12,000.

**Steel and Iron Bars.**—Except for a revival in inquiry for bars for shrapnel shells, some large orders for which have lately been placed, the market is without special color. Largest consumers are covered with contracts against which they are specifying in fair quantities, but new buying is of such small volume that prices have not yet been tested, and this is true of refined iron as well as steel bars. We quote mill shipments of steel bars at 1.15c., Pittsburgh, or 1.319c., New York, and refined iron bars 1.20c. to 1.25c., New York. Out of store in New York we quote iron and steel bars at 1.80c. to 1.85c.

**Cast-Iron Pipe.**—Contracts for pipe laying, involving a total of about 1100 tons of cast-iron pipe for the boroughs of Queens and the Bronx, were let March 8 by the Department of Water, Gas and Electricity of the city of New York. It is understood that the successful contractors for a considerable part of this work have arranged to purchase the pipe required by them from the Standard Cast Iron Pipe & Foundry Company. The same department will open bids on Thursday of this week for about 200 tons of flexible joint pipe. Private buying has again improved, and orders of this character have been quite numerous, although involving no considerable quantities. A better feeling prevails among pipe manufacturers, and a noteworthy tendency is now observed among those in the vicinity of Philadelphia to stiffen prices. Some who have been conspicuous in naming low prices have bid above others on recent lettings. Carload lots of 6-in. can still be had at \$20 to \$20.50 per net ton, tidewater.

**Old Material.**—The market is sentimentally stronger. Holders of scrap are gradually advancing their asking prices, and although consumers are contesting such efforts to mark up values they are apparently no longer able to dictate terms. Dealers' quotations, per gross ton, New York, are as follows:



Old girder and T rails for melting....	\$8.50 to \$8.75
Heavy melting steel scrap.....	8.50 to 8.75
Relaying rails.....	19.00 to 19.50
Re-rolling rails (nominal).....	8.75 to 9.00
Iron car axles (nominal).....	15.25 to 15.75
Steel car axles.....	11.50 to 12.00
No. 1 railroad wrought.....	10.25 to 10.75
Wrought-iron track scrap.....	9.50 to 9.75
No. 1 yard wrought, long.....	9.50 to 9.75
No. 1 yard wrought, short.....	8.75 to 9.00
Light iron.....	3.50 to 4.00
Cast borings.....	6.00 to 6.25
Wrought turnings.....	6.25 to 6.75
Wrought pipe.....	8.00 to 8.25
Car wheels.....	9.50 to 9.75
No. 1 heavy cast, broken up.....	10.50 to 11.00
Stove plate.....	8.00 to 8.25
Locomotive grate bars.....	7.00 to 7.50
Malleable cast.....	7.25 to 7.75

## British Markets Dull

### Steel Plant Long Idle Restarted—Ferro-Manganese Dearer—American Sales

(By Cable)

LONDON, ENGLAND, March 10, 1915.

Markets are very dull, with essential conditions unaltered. David Colville & Sons, Ltd., whose steel plant is at Motherwell, Lanarkshire, Scotland, has taken over the Glengarnock Iron & Steel Company's steel plant, which has been idle, to push forward government orders. Pig-iron reports remain very poor. Home trade is sluggish. Stocks in Connal's store are 124,998 tons, against 125,693 tons one week ago. Furnaces in blast number 166; one year ago, 172.

Semi-finished steel is firm. American blooms have sold at 120s. (\$29.20), c.i.f. Liverpool, and 125s. (\$30.42) is asked for billets. The freight position forms the chief hindrance to business. Tin plates are very strong. Rails are slow, but prices are firm. Ferromanganese is dearer and it is hoped some abatement of government restrictions on shipments will come soon. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 15s. 6d. (\$3.77), against 15s. (\$3.65) last week.

Cleveland pig iron warrants, 57s. 11d. (\$14.09), against 56s. 6d. (\$13.75), last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 58s. 6d. (\$14.24), against 56s. 9½d. (\$13.82), last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, 49 (\$43.79), against £10 5s. (\$49.88) last week.

Steel ship plates, Scotch, delivered local yards, 48 15s. (\$42.58), against 48 10s. (\$41.36) a week ago.

Steel rails, export, f.o.b. works port, 47 2s. 6d. (\$34.67).

Hematite pig iron, f.o.b. Tees, 90s. (\$21.89).

Sheet bars (Welsh), delivered at works in Swansea Valley, 46 15s. (\$32.85), against 46 10s. (\$31.63) a week ago.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, 48 10s. (\$41.36), against 48 5s. (\$40.15) last week.

Steel bars, export, f.o.b. Clyde, 48 15s. (\$42.58), against 48 10s. (\$41.36) a week ago.

Ferromanganese, f.o.b. £15 10s. (\$75.42).

### German Steel Works Union's January Output

The German Steel Works Union's shipments for January, 1915, were 255,016 metric tons, as compared with 268,189 tons in December, 1914, and 455,191 tons in January, 1914. Of this total January shipments, semi-finished steel constituted 51,832 tons (143,002 tons in January, 1914); railroad material, 151,841 tons (211,390 tons a year ago), and shapes, 51,343 tons.

The Trumbull Steel Company, Warren, Ohio, recently shipped a trainload of tin plate comprising 25 cars to Alaska to be used for making tin cans for packing salmon. It is estimated that enough tin plate was in the shipment to manufacture over 7,000,000 cans. The route was via New York and the Panama Canal to San Francisco and thence it will go by another steamer to Alaska.

## Metal Market

NEW YORK, March 10, 1915.

### The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Tin,	Lead		Spelter		
			New	St.	New	St.	
Mar.	Lake	Electro-lytic New York	York	Louis	York	Louis	
3.....	15.25	14.62½	42.00	3.90	3.85	10.75	10.50
4.....	15.25	14.62½	44.50	3.90	3.85	11.00	10.75
5.....	15.25	14.62½	48.75	3.95	3.87½	11.25	11.00
6.....	15.25	14.62½	.....	3.95	3.87½	11.25	11.00
8.....	15.25	14.62½	49.50	3.95	3.87½	11.25	11.00
9.....	15.25	14.75	47.00	3.95	3.87½	11.25	11.00

Electrolytic copper is higher, with indications of better demand. Tin advanced to 50c., but quotations and the anxiety of consumers are now easier. Lead is strong at an advance of \$1 per ton. Spelter has continued to advance. There are no offerings of antimony from England and quotations are higher.

### New York

**Copper.**—In the past few days a good business has been done in Lake, with Europe still the principal buyer. Domestic consumers, however, have come into the market stronger, partly as a result of a little more activity on the part of the wire mills. In a general way, the market is more buoyant and at least one large producer has made the effort to send the price of electrolytic to 15c., New York, full terms. A step in this direction was the announcement that some heavy inquiries had been received from Russia and that if the sales were made prices would surely advance. On the other hand, prior to Monday, there were offerings of electrolytic at substantial concessions by second hands. Yesterday the market took a decided turn and became strong on business that was done at prices ranging between 14.75c. and 14.87½c. cash, New York. The bulk of the business was done at the lower price. Prime Lake is firm at 15.25c., and while inferior grades can be had for less, choice brands command the price named, or more. Deliveries of Lake this side of May are most difficult to get. Exports this month total 9081 tons.

**Tin.**—On March 3 the market was dull, but strong, and there were light sales of spot at prices ranging from 41.50c. to 42.50c. The following day buying began at 43.50c. and ended at 45c. A feature of the day was the ease with which 5-ton lots could be bought as compared with 15 or 20 ton lots. It was evident that sellers were unwilling to part with the metal they held presumably because of the likelihood of their having to use it to cover contracts. On March 5 a good business was done and between 250 and 350 tons changed hands, although most of the transactions were between dealers and consisted largely of exchanging one position for another. With the beginning of this week, after the high point was reached, the market turned and heaviness set in. On Monday there were sales of 5-ton lots of spot at 50c., later in the day another at 49.50c. and at the close 49c. would have been accepted but there was no buyer. Yesterday sales of spot were recorded at 48c. and later in the day at 45.50c. The original cause of the upward trend was widespread doubt as to the supply from London, which was intensified by the urgent need of some consumers. The nervousness subsided with reports that arrivals would not be so light as had been feared. Those of this month amount to only 75 tons, but there is afloat 3365 tons, including 550 tons from Singapore on the steamer Shimosa, which was at Malta March 4 making repairs. Shipments scheduled from London are small. The New York quotation yesterday was 47c. and weakness at London today indicates a decline from this level.

**Lead.**—The American Smelting & Refining Company on March 5 advanced its quotation \$1 per ton, making the New York price 3.95c. Since then the St. Louis price has been 3.87½c. The trade was surprised that the New York quotation was not advanced to 4c. The market has been dull on both domestic and foreign account, but that Europe will come forward again in a few days is generally believed, and the market is strong.



**Spelter.**—Quotations yesterday ranged from 11.25c. to 11.35c., New York, for prime Western. Brass mill special is quoted around 13c. and shipments are difficult to obtain this side of June. In ordinary grades a trace of weakness is reported to have developed this week, but it has not affected prices as yet. It springs from a report that the enormous production of ore is exceeding actual need, great as this is reported to be. Where large deals are made direct with producers it is understood that less than the market quotation can be done. The St. Louis quotations is 11c.

**Antimony.**—With no offerings from England business is almost entirely confined to sales of Chinese antimony, which is quoted at 20.50c. to 22.50c., duty paid. Hallett's nominal at 25c. to 26c., and Cookson's at 27c. to 28c. The demand generally is quiet.

**Old Metals.**—The market is quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	13.25 to 13.75
Copper, heavy and wire.....	13.00 to 13.50
Copper, light and bottoms.....	12.00 to 12.50
Brass, heavy.....	9.50 to 9.75
Brass, light.....	7.50 to 7.75
Heavy machine composition.....	11.25 to 11.75
Clean brass turnings.....	9.25 to 9.50
Composition turnings.....	9.75 to 10.00
Lead, heavy.....	3.60
Lead, tea.....	3.35
Zinc, scrap.....	8.00

### Chicago

MARCH 8.—The price of most metals continues to soar. Substantial advances are noted for lead, spelter and sheet zinc. Of Cookson's antimony, there appears to be none available. With a temporary scarcity of tin in transit, quotations have advanced sharply as compared with our last price. Copper is unchanged, but the metal is in good demand and the market strong. We have revised our prices and quote as follows: Casting copper, 14.50c.; Lake copper, 14.75c., for prompt shipment; small lots, 1/4c. to 1/2c. higher; pig tin, carloads 50.5c.; small lots, 52.5c.; lead, desilverized, 3.90c., and corroding, 4.10c., for 50-ton lots; in carloads, 2 1/2c. per 100 lb. higher; spelter, 11c., nominal; sheet zinc, 13.50c.; Cookson's antimony, 26c., for cask lots; other grades, 20c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 11.75c.; copper bottoms, 10.25c.; copper clips, 11.50c.; red brass, 10.25c.; yellow brass, 8.25c.; lead pipe, 3.25c.; zinc, 7.25c.; pewter, No. 1, 25c.; tinfoil, 33c.; block tin pipe, 36c.

### St. Louis

MARCH 8.—The excited condition of the market on non-ferrous metals continues and prices have continued to move skyward. Spelter is quotable today at 11c.; lead, 3.90c.; tin, 52c.; Lake copper, 15.50c.; electrolytic copper, 15.25c.; antimony, 25c. In the Joplin ore district there was a weaker feeling in zinc ore prices, giving color to the charge that the smelters are trying to force them below their natural relation to metal figures. The best price obtainable during the week was \$75, on settlement, while the range of basic ore was \$66 to \$73 per ton. Calamine was dull at \$40 to \$43 for 40 per cent., with the best settlement at \$45. Lead ore was inactive at \$46, despite the advance in the price of the metal. Miscellaneous scrap metals are quoted as follows: Light brass, 6c.; heavy yellow brass, 7.50c.; heavy red brass and light copper, 9.50c.; heavy copper and copper wire, 10.50c.; zinc, 5c.; lead, 3.50c.; pewter, 23c.; tinfoil, 26c.; tea lead, 3.50c.

The L. S. Starrett Company, Athol, Mass., has voted to increase its capital stock by \$1,500,000, represented by 15,000 preferred shares. The capital of the company will then be \$5,000,000, of which 30,000 shares will be preferred and 20,000 common. The new preferred is 6 per cent. cumulative, non-voting, and callable at \$110 and accrued dividends in amounts not less than 10 per cent. of the stock outstanding. A sinking fund is to be established by the annual payment of 2 per cent. on the preferred after 10 per cent. annually shall have been paid on the common, which sinking fund may be used either to retire the preferred or to purchase it in the market if it can be obtained for less than \$110.

## Iron and Industrial Stocks

NEW YORK, March 10, 1915.

The course of prices of securities has been almost continuously upward. Among the influences favorably affecting railroad and other stocks have been the sharp decline in the price of wheat, the subsidence of sales of stocks and bonds on European account, the persistent reports of an earlier close to the war than seemed probable some time ago, and improving conditions in numerous branches of domestic business. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	8 1/4 - 9 1/4	Nat. En. & St., com.	10 - 11
Allis-Chal., pref.	34 - 35	Nat. En. & St., pref.	84 - 85
Am. Can., com.	26 1/2 - 28 1/2	Pressed Stl., com.	25 - 28
Am. Can., pref.	93 1/4 - 95 1/2	Pressed Stl., pref.	88
Am. Car & Fdy., com.	40 1/2 - 42 1/2	Ry. Spring, com.	19 - 20 1/2
Am. Car & Fdy., pref.	112 1/2 - 112 3/4	Ry. Spring, pref.	87
Am. Loco., com.	19 - 21	Republic, com.	19 1/2 - 20 1/2
Am. Loco., pref.	75 - 78	Republic, pref.	75 1/2 - 77 1/2
Am. Steel Fdries.	24 1/4 - 24 3/4	Rumely Co., com.	7 1/2 - 14
Bald. Loco., com.	26 1/2 - 31	Rumely Co., pref.	3 1/2 - 3 1/4
Bald. Loco., pref.	92 - 95	Sloss, com.	25 1/4 - 26 1/4
Beth. Steel, com.	54 1/2 - 56 1/2	Pipe, com.	10 1/2 - 10 3/4
Beth. Steel, pref.	103 3/4 - 104 1/2	Pipe, pref.	32 1/2 - 34
Colo. Fuel	24 1/2 - 25 1/4	U. S. Steel, com.	42 1/2 - 46
General Electric	138 - 141	U. S. Steel, pref.	104 1/2 - 105 1/2
Gt. No. Ore Cert.	31 1/2 - 32 1/4	West'gh'se Elec.	68 - 69
Int. Harv. of N. J., com.	90 1/2 - 94	Chic. Pneu. Tool	47 1/2 - 48
Int. Harv. Corp., com.	70	Cambria Steel	42 1/2 - 43
Int. Harv. Corp., pref.	90 1/2 - 96	Warwick	9 1/2 - 9 3/4
Int. Pump, com.	7 1/2	Cruc. Steel, com.	13 1/4 - 13 1/2
		Cruc. Steel, pref.	76 - 77 1/2
		Harb.-Wk. Ref., pref.	99
		La Belle Iron, com.	27 1/4 - 28

### Dividends

The Canadian Locomotive Company, regular quarterly, 1 1/4 per cent. on the preferred stock, payable April 1.

The American Steel Foundries has passed the quarterly dividend of 1/2 of 1 per cent., due at this time. The decision to declare no dividend was, according to President Lamont, "in view of business conditions."

The American Can Company, regular quarterly 1 1/4 per cent. on the preferred stock, payable April 1.

The American Car & Foundry Company, regular quarterly, 1 1/4 per cent. on the preferred and 1/2 of 1 per cent. on the common stock, payable April 1.

The Packard Motor Car Company, regular quarterly, 1 1/4 per cent. on the preferred stock, payable March 15.

The American Brake Shoe & Foundry Company, regular quarterly, 2 per cent. on the preferred and 1 1/4 per cent. on the common stock, payable March 31.

### Chicago Railway Equipment Company

The twenty-second annual report of the Chicago Railway Equipment Company, Chicago, covering the year ended December 31, 1914, discusses the general railroad situation as bearing on its own business. It states that the total number of cars ordered from car builders in 1914 was 80,264, as against 146,732 in 1913 and 234,758 in 1912; the total number built in 1914 was 104,541, in 1913 207,684, and in 1912 152,429. Despite this condition of railroad buying the usual dividends were paid by the company amounting to \$174,020, and \$217,047.83 was expended for plant betterment, largely for the rebuilding of the Franklin plant. The condensed balance sheet is as follows:

Assets	
Property account.....	\$1,903,476.57
Goodwill and patents.....	775,706.34
Current assets, inventories, investments, receivables and cash.....	1,356,149.78
Deferred charges.....	7,833.51
Total.....	\$4,043,166.20
Liabilities	
Capital account.....	\$2,486,000.00
Current liabilities.....	386,446.59
Reserves, including general reserve....	841,303.37
Undivided profits.....	329,415.94
Total.....	\$4,043,166.20

The Chicago Bridge & Iron Works, Washington Heights P. O., Chicago, has opened a city sales office, 1334 McCormick Building, Chicago, with F. L. Cook in charge.

## PERSONAL

W. S. Pilling, Pilling & Crane, Philadelphia, left for the Pacific coast March 2, and will be gone about six weeks.

A dinner was given to H. V. Jamison, advertising manager of the American Sheet & Tin Plate Company, at San Francisco, February 27, by a number of representatives of United States Steel Corporation subsidiaries who were associated with him in preparing individual portions of the Steel Corporation's exhibit. Mr. Jamison some months ago was made director of the exhibit and has had charge of its installation, the enterprise being under the general supervision of a committee of which A. T. De Forest is chairman. The dinner in recognition of Mr. Jamison's work was given at the Old Faithful Inn in the Yellowstone Park concession on the Zone at the Panama-Pacific International Exposition. As a memento those in attendance presented to him an enlarged photograph of the Steel Corporation exhibit, hand colored and framed.

W. H. Gibb, formerly sales manager of the Stupakoff Laboratories, Pittsburgh, has incorporated the Gibb Instrument Company, Highland Building, Pittsburgh, to manufacture thermo-electric pyrometers, potentiometers and the pyrochronograph, an invention for taking open-hearth bath temperatures.

Charles A. Schieren, father of Charles A. Schieren, Jr., president of the Charles A. Schieren Company, belting manufacturer, New York, is seriously ill at his home in Brooklyn. He was mayor of Brooklyn some years ago.

Merrill G. Baker has become associated with J. Leonard Replogle, who retired March 1 as vice-president and general manager of sales of the Cambria Steel Company to become vice-president and general manager of sales of the American Vanadium Company, Pittsburgh. Mr. Baker has been connected with the Cambria Steel Company as assistant to the sales manager and was in charge of rails, forgings, etc. Harry G. Up-house, formerly sales agent of the Cambria Steel Company at Johnstown, has succeeded to the position left by Mr. Baker, with headquarters in Philadelphia.

J. L. Nichols has been appointed assistant superintendent and assistant metallurgist of the open-hearth plant of the Pittsburgh Crucible Steel Company, at Midland, Pa. Mr. Nichols has had five years' experience in making different kinds of steels. He spent three years in the Bessemer department of the Lackawanna Steel Company, Buffalo, N. Y., the last year of which he was in charge of the department. He went to Midland two years ago where he spent several months on construction work; then took up furnace work when operation was started in August, 1913. He was graduated in metallurgy from the Pennsylvania State College.

A. P. Scott, lately metallurgical engineer of the Dominion Iron & Steel Company, Ltd., of Sydney, Nova Scotia, has severed his connection with that company and will shortly remove to Montreal where he will locate as a consulting metallurgist. Mr. Scott is well known in Montreal and has had a wide experience in American and Canadian iron and steel works.

William B. Dickson, Montclair, N. J., formerly first vice-president of the United States Steel Corporation, has been chosen president of the board to conduct the Essex County vocational school work. The work will be carried on by a director who will be appointed by the board.

B. F. Harper, Cleveland, Ohio, has resigned as sales agent for the Ft. Wayne Rolling Mill Company, Ft. Wayne, Ind., the change becoming effective April 1.

Eugene Haanel, director of mines of Canada, has been elected vice-president of the Faraday Society of England.

Edward A. Stulz, for 18 years sales manager of the Ogden Iron & Steel Company, New York, has become connected with the Faltoute Iron & Steel Company,

Newark, N. J., and will take charge of the company's selling on March 15.

S. G. Pollard, formerly superintendent of pumping of the Cincinnati water works, and a member of the firm of Pollard & Ellms, consulting engineers, Cincinnati, has been obliged to retire from business on account of ill health and will leave shortly to take up his residence in California. When he regains his health he plans to engage in engineering there. The Cincinnati office of the firm will be continued by J. W. Ellms and all unfinished work and tentative contracts will be completed by him.

A. C. Cook, sales manager of the Warner & Swasey Company, Cleveland, Ohio, who has been in Europe on business for the past two or three months, sailed for home March 6.

Charles W. Hyne, who was for 18 years connected with the Buffalo Structural Steel Company, latterly as office manager, has severed his connection with that company and is now with the Ferguson Steel & Iron Company, Buffalo, as manager, the change taking effect March 1.

B. H. Bryant, civil engineer, has returned from Guatemala, Salvador and Honduras where he had been locating railroad lines as chief locating engineer of the International Railways of America, and is taking a much needed vacation in Washington, D. C.

Blaine S. Smith has been appointed to succeed B. F. Affleck, now president, as general sales manager of the Universal Portland Cement Company, Chicago.

T. Brooke Anderson, formerly assistant manager of the post department of the American Steel & Wire Company, Chicago, has resigned to organize the Chicago Steel Post Company, 208 South LaSalle street, with works at Chicago Heights, Ill.

Lawrence Addicks, former superintendent of the United States Metals Refining Company, Chrome, N. J., is now connected with the operations of Phelps, Dodge & Co., at Douglas, Arizona.

Charles T. Kingston, for 20 years with John B. Brennan & Co., boilermakers, Detroit, Mich., has become secretary and general manager of the Weil Boiler Company, Indianapolis, Ind., recently incorporated.

## Canada's Pig-Iron Output in 1914

TORONTO, March 8, 1915.—According to a preliminary report just issued by the Department of Mines, Ottawa, the production of pig iron in Canada in the calendar year 1914 fell off over 30 per cent. compared with 1913. The total was 783,164 net tons, which is the smallest since 1909. Of this 9380 tons was made with charcoal and 773,784 tons with coke. Based on an estimate of \$12.77 per ton at furnace, the value is placed at \$10,002,856. The classification of production according to the purpose for which it was intended was: Bessemer, 230,817 tons; basic, 346,553 tons; foundry and malleable, 205,794 tons.

Most of the ore used was imported from Newfoundland, only 182,964 tons being the product of Canadian mines. The quantity imported was 1,324,326 tons. Under the new tariff, iron ore has been made dutiable at 6c. per ton preferential and 8c. per ton intermediate and general. The iron ore shipped from the mines of Canada in 1914 was 244,854 net tons, valued at \$542,041.

Coke was used to the extent of 921,171 tons, of which 330,269 tons was from Canadian coal and 590,902 tons was either imported or made from American coal. The quantity of charcoal fuel used was 920,045 bushels and of limestone flux 447,636 net tons.

Some blast furnaces were idle throughout the year. The manufacturers operating furnaces were the Dominion Iron & Steel Company, the Nova Scotia Steel & Coal Company, Algoma Steel Corporation, Steel Company of Canada, Standard Iron Company and Canada Iron Furnace Company.

Ontario produced the largest quantity of pig iron, namely, 556,112 tons. Nova Scotia made 227,052 tons. In 1914 Canada exported 19,063 tons of pig iron, valued at \$486,366, and imported 100,827 tons, valued at \$1,531,674.

W. L. E.



# Precision in Foundry Cupola Operation\*

Standardization of Variables to Be Desired—  
Utilization of Waste Gases—Determination of  
Admixture of Air and Fuel a Prime Requisite

BY DAVID TOWNSEND

Plenty of foundries are run to-day by men who boast that any boiler shell can be set on end, bricked up and made into a good working cupola. Most foundrymen when asked for their melting records will give figures which are in no wise near their actual practice. Many a foundry is running behind to-day because of the high percentage of bad castings and melting losses due to causes which could be definitely determined and corrected if the same amount of time and brains were put into the job as would be considered a fair expenditure for investigating and improving any other foundry operation.

Unfortunately, no concerted action has as yet been taken by the various manufacturers of cupolas to standardize the variables which form the basis for a properly constructed machine. The number, position and size of the tuyeres, location and size of windbox, diameter of windpipe as affected by distance between cupola and blower, shape of interior outline of the lining, and other points might be scientifically determined and forever removed from the field of speculation or of personal opinion.

It is true that a start has been made in this direction by the government in its testing laboratory at St. Louis, the results of which will be found in Bulletin No. 54 of the Bureau of Mines; but the investigation covered only a limited field, being based on the results obtained from a size of cupola (27-in.), which is not generally used except by small jobbing shops or for occasional small or special heats in the larger plants.

## WASTE HEAT SHOULD BE UTILIZED

If you will stop to consider the high standing and scientific reputation of the long line of investigators of the blast furnace you can appreciate the manner in which the foundry cupola has been neglected. Millions have been spent by the builders and owners of blast furnaces in accurately determining every variable factor entering into the production of pig iron and auxiliary apparatus of the most expensive character has been added in order to obtain a high temperature of blast and a supply of air for combustion which will be free from moisture.

While moisture-free air is undoubtedly too much of a refinement for the cupola, which is operated only intermittently, there is no good reason why the waste gases should not be used to heat the incoming air, nor is there any reason to suppose that it would not pay to determine accurately the best shape for the interior lining and adopt a standard for charging and operating which would produce fairly uniform results.

In the blast furnace the waste gases are used to heat the blast to 1000 deg. to 1500 deg. F., but in the cupola valuable heat is practically wasted. Of course, the waste gases from the cupola will have a very much lower temperature than those from the blast furnace, as the cupola temperature averages 2800 deg. F. at the melting zone as against 3500 deg. F. in the blast furnace. Numerous attempts have been made to utilize the waste heat, but there will have to be a radical departure from the present design of the cupola before it can be accomplished. In other words, the cupola must be converted into a miniature blast furnace with charging bell and means to maintain a uniform pressure, no matter how small. This obviously cannot be done on a small cupola used for a few hours each day, but there should be no insuperable difficulty in doing it in the large tonnage foundry.

\*From a paper read before the Philadelphia Foundrymen's Association, March 4, 1915. Mr. Townsend is president of the Production Engineering Company, Philadelphia.

## DEFINITE DETERMINATION OF CUPOLA GASES

The importance of securing and maintaining a proper combination of carbon and oxygen is shown by the fact that carbon, when burned completely to  $\text{CO}_2$ , gives off about 14,500 B.t.u., while carbon burned to CO produces only 4450 B.t.u., a direct loss of about 10,000 B.t.u. by imperfect combustion. As both CO and  $\text{CO}_2$  are colorless, odorless gases, the loss may be taking place and be continuous without the knowledge of the operator; in fact, nothing but an analysis of the gases will definitely fix the responsibility. In these days of automatic  $\text{CO}_2$  recorders of low price there is nothing except habit to prevent a study of the gases, which can then be controlled until a uniform method of operation has been evolved.

Every pound of pure carbon theoretically requires 2.67 lb. of oxygen or 11.52 lb. of air for its complete combustion to  $\text{CO}_2$ . Unfortunately, air contains only about 23 per cent. of oxygen. An average 72-hr. Pennsylvania foundry coke has about the following analysis:

	Per cent.
Moisture .....	0.50
Volatile combustible .....	0.60
Fixed carbon ..	87.75
Ash .....	10.35
Sulphur .....	0.80
	100.00

In order to burn completely coke of this analysis we must supply sufficient air to furnish the necessary amount of oxygen. If we assume, for the sake of illustration only, that the cupola is running on a 10 to 1 melting ratio, for each 2000 lb. of iron we will use 200 lb. of coke of which 175.5 lb. will be carbon requiring 2022 lb. of air for its complete combustion. Air is usually measured in cubic feet, but as the weight varies with the temperature, moisture, etc., we may assume that it will be supplied at an average temperature of 70 deg. F. in which case the above coke will require 154.7 cu. ft. of free air per pound of carbon or a total of 27,150 cu. ft. which is not far from the 30,000 cu. ft. of free air usually considered necessary to melt one ton of iron.

An admirable discussion of the variables entering into the melting of iron in a cupola may be found in Bulletin No. 3 issued by the Bureau of Mines, but particular attention should be called to the fact that even if the proper combination of air and fuel may have taken place in the melting zone, actual heat might be lost if conditions are such that the  $\text{CO}_2$  is reacted on in passing up through the incandescent coke and reduced to CO, which may be detected by the flame seen burning in the upper part of the cupola. This reaction takes up the heat which it had previously given off and the result is a very considerable drop in temperature, thus robbing the descending iron of the amount of pre-heating it would otherwise get before sinking into the melting zone.

The proper distribution of the air entering the cupola and its union with the fuel will cure many ills such as burnt, cold and spongy iron, which are the result not so much of the quality of the metal charged, as of errors in melting and manipulation.

Considerable care is generally taken to measure and record the amount of iron and coke which are put into the cupola, but who ever weighs or measures the air that is being used? That this is just as important an item as any other cannot be disputed when it is remembered that of the above 27,150 cu. ft. of air, about 77 per cent is nitrogen, which must be heated to the temperature of the furnace and then discharged into the atmosphere without having done any work,



unless it is utilized to pre-heat the incoming air, as is done in the blast furnace.

#### REGULATING CONSTANCY AND PRESSURE OF AIR

In furnishing air to the cupola the most important condition is to have a continuous supply at a constant pressure and this can only be obtained by having an air-tight chamber of sufficient size between the cupola and the source of air supply to equalize all pulsations, belt slippages, etc., which will otherwise affect conditions for proper working. The present wind-box supplied by the cupola builder does not give a sufficient volume to properly equalize the pressure, which may be readily proven by putting a sensitive pressure-gauge or U-tube on the wind-box and observing the variations that are produced by the action of the blower. It is not only important to get the right amount of air for complete combustion into the cupola, but equally so not to get too much, as a surplus has a decided cooling effect.

The amount of air necessary for the complete combustion of the fuel put into a cupola depends upon a considerable number of variables, chief of which are the carbon content of the fuel, pressure and distribution of the air, and constancy of supply of both fuel and air. Our company has had occasion several times to investigate the gauge question and it has designed and patented a low-pressure circular gauge ranging from 0 to 16 oz. of pressure, the readings being indicated on a circular dial, similar to those of steam gauges, and having divisions as fine as 1-10 ounce, the division for one ounce being about  $\frac{3}{8}$  in. in length. The gauge, when filled with a special liquid, will read from 0 to 2 in. of water for either pressure or vacuum, the divisions being as fine as one five-hundredth inch of water.

#### METHODS OF MEASURING AIR VOLUME

It is a difficult operation to determine the volume of air going into the cupola at any given time. This is usually done by means of a Pitot tube, which consists of two copper tubes of small diameter ( $\frac{1}{8}$  in.) and having their ends bent over at right angles and tapered, the two tubes being fastened together so that the bent ends point in opposite directions. The free ends of the tube are attached to the draft or pressure gauges in such a manner that the readings will represent the pressure in one tube and the suction in the other, the difference being the measure of the velocity of the air in the blast pipe and from which the volume of air passing may be determined. The position of the two bent tubes in the blast pipe gives different readings and an average must be obtained to get any scientific results. As the velocity of air under pressure passing through a pipe varies considerably from the center to the periphery, the results obtained must be averaged in order to get any reliable information as to the volume, which of course is the product of the area of the pipe in square feet multiplied by the velocity in feet per unit of time as calculated from the Pitot tube readings. Because of the pressures produced in the two Pitot tubes being very small, it is at present necessary to use two inclined manometers reading in inches of water and use the differences for making the velocity calculations.

Our low pressure and vacuum gauge (reading to 1 in. or 2 in. of water and down to  $\frac{1}{1000}$  in.) if required, gives the difference of pressures between the two Pitot tubes directly on the scale and requires only a simple calculation to determine the volume of air passing through any given size of blast pipe. The ideal volume meter would be one which would be entirely within the blast pipe itself, and through which all the air passing from the blower or fan to cupola must go, there being no average to compute and no loss due to leakage or friction. We have designed and have now in the Patent Office a meter which fulfils these requirements and in addition has a scale from which the volume of air passing at any given time may be read off directly.

#### MANIPULATION OF BLOWER OR FAN

For the best results, there should be provided a relief valve which can be set to maintain any pressure

desired and which will automatically open if an excessive pressure is generated. The usual practice with cupola tenders when they want to slack down is to reduce the speed of the blower or, in some instances, shut it down altogether. This, of course, applies more particularly to positive pressure blowers, as fans will take care of themselves if the blast pipe is closed off. Blowers, however, should never be stopped after being started, but should be relieved and the melting rate regulated by means of a relief valve on the blast pipe line and near to the cupola wind-box. Our company's special air regulating blast valve may be applied to any size blast pipe and has an automatic relief device for the protection of the blower and the blast pipe. This valve can be set to open at any pressure desired or can be left open, instead of shutting off the blower or fan if for any reason it is desired to stop or slacken up on the rate of melting. By its use in connection with the pressure gauge any desired pressure may be obtained and maintained.

Any scientific investigation which embraces only one end of the melting operation would be incomplete. In order to know whether we have obtained the best results possible by control of the pressure and amount of the blast and its proper distribution in the cupola, we must also know if it has completely performed its intended function during the melting operation. This can best be ascertained by an analysis of the waste gases in the stack above the charging door taken in conjunction with pyrometric temperature readings at several points in the cupola and stack.

#### SAMPLING GAS FOR ANALYSIS

In order to secure a proper gas sample from the stack, the sampling tube should go all the way across the inside of the lining and be furnished with a number of equidistant holes to assure a proper average. Care should also be taken to shut off temporarily any air which may be induced through the charging door, by closing the door tightly with a temporary solid shield and allowing the gases to flow through the tube for a short time before collecting the sample. A determination of the  $\text{CO}_2$ ,  $\text{CO}$  and  $\text{O}$  will indicate what is taking place in the melting and heating zones and when taken in conjunction with temperature readings, the necessary remedies may be applied to correct improper methods of operation.

Of course, no definite or lasting results can be obtained from an occasional or haphazard burst of enthusiasm for better things, as the data collected are generally insufficient on which to predicate changes or future results, but I trust the much abused and neglected foundry cupola may eventually come into its own and receive the treatment which it deserves and for which it will amply repay in quality and quantity of product.

#### Zinc Exports Heavy in War Months

An error was made in printing in *The Iron Age* of February 25, page 474, Government statistics of exports of domestic zinc in the form of pigs, bars, plates and sheets. The correct figures are given below:

	1914	1913
July .....	140	355
August .....	3,079	475
September .....	17,005	51
October .....	9,160	74
November .....	11,381	26
December .....	16,354	61
Twelve months ended December 31 .....	57,770	6,949
Six months ended June 30 .....	651	5,905

It will thus appear that while in the first half of 1914 zinc exports in the forms named were only 651 tons, and for the year ended June 30, 1914, only 1695 tons, the total for the war period of 1914 was over 57,000 tons.

The standard code of safety grinding regulations adopted by all abrasive wheel manufacturers and printed at length in these columns has been issued in pamphlet form by the Pittsburgh Emery Wheel Company, Rochester, Pa. A copy may undoubtedly be had for the asking. The pamphlet also includes a monograph by Charles G. Smith, president of the company, on "Emery Wheel Practice in Foundries."

## BOILER STEEL SPECIFICATIONS

### Stipulations of the Mechanical Engineers' Code Covering Plates, Rivets, Staybolts, Etc.

The report of the Boiler Code Committee of the American Society of Mechanical Engineers, which report has now been accepted by the council of the society, contains among the rules for the construction of stationary boilers a number of specifications to which attention may now be called. Incidentally, the report may well be highly commended. It signalizes one of the most ambitious efforts which the society has ever made to meet its obligations to industry. A number of times mention has been made in these columns of the herculean task represented in bringing consuming and manufacturing interests together, both among themselves and as between each interest, and the report is the result of numberless conferences and repeated committee meetings.

The rules, including the specifications, are now printed in a pamphlet of some 114 pages, and cover both power and heating boilers, and rules as applied to new installations and to existing installations. The specifications for the lap welded and seamless welded boiler tubes, which were approved by the Boiler Tube Manufacturers of America on September 25, were printed in *The Iron Age* of December 17, 1914.

#### BOILER PLATE STEEL

The specifications for boiler plate steel are similar to those of the American Society for Testing Materials, as indeed most of the other specifications are. One difference is that the Testing Materials specification allows a range of 0.12 to 0.25 per cent. for the carbon in fire-box plates, while in the Mechanical Engineers' specification this range is allowed for fire-box plates of  $\frac{3}{4}$  in. thickness and under, while for plates over  $\frac{3}{4}$  in. the carbon range is 0.12 to 0.30 per cent. Similarly the tensile strength of fire-box steel, under the Testing Materials specification, is 52,000 to 62,000 lb. per sq. in., while for the Mechanical Engineers' the range is 55,000 to 63,000 lb. per sq. in. In that connection it is specified that, "if desired, steel of lower tensile strength than the above may be used in an entire boiler, or part thereof, the desired tensile limits to be specified, having a range of 10,000 lb. per sq. in. for flange or 8,000 lb. per sq. in. for firebox, the steel to conform in all respects to the other corresponding requirements herein specified, and to be stamped with the minimum tensile strength of the stipulated range."

As regards modifications in elongation, for plates over  $\frac{3}{4}$  in. thickness, the deduction is just as the Testing Materials specification, namely, 0.5 from the percentage of the elongation specified for each increase of  $\frac{1}{8}$  in. in thickness, above  $\frac{3}{4}$  in., to a minimum, however, of 20 per cent. Like the Testing Materials specification, a limit of 0.01 in. is given for the variation of each plate under the gauge specified, but instead of allowing for any excess of weight, it is stated that "the overweight limits are considered a matter of contract between the steel manufacturer and the boiler builder."

The marking of plates is also different from the Testing Materials specification. It is specified that each plate shall be marked in three places, "two of which shall be located at diagonal corners about 12 in. from the edge and one about the center of the plate, or at a point selected and designated by the purchaser so that the stamp shall be plainly visible when the boiler is completed." It is also specified, as regards marking, that each head shall be legibly stamped by the manufacturer in two places, about 12 in. from the edge, with the melt or slab number, name of manufacturer, grade, and the minimum tensile strength of the stipulated range, in such manner that the stamp is plainly visible when the boiler is completed. Each butt strap shall be legibly stamped by the manufacturer in two places on the center line about 12 in. from the ends with the melt or slab number, name of manufacturer, grade, and the minimum tensile strength of the stipulated range as specified.

#### STAYBOLT STEEL

The specifications for boiler rivet steel are the same

as those of the American Society for Testing Materials, but the society's boiler code committee has developed a new specification for staybolt steel, which specifies that the steel shall conform to the requirements of boiler rivet steel, except that the tensile strength has a range between 50,000 and 60,000 lb. per sq. in., that the minimum yield point shall be  $\frac{1}{2}$  tensile strength and that the percentage of elongation in 8 in. shall be equal to 1,500,000 divided by the tensile strength.

The specifications for steel bars are like those for structural steel for bridges of the American Society for Testing Materials. The specifications of steel castings are also like those for the Testing Materials Society, parts being used so far as necessary to cover boiler castings. The specifications for gray iron castings are identical with those of the American Society for Testing Materials, as are also the specifications for malleable castings.

#### BOILER RIVET IRON

The specifications for boiler rivet iron are an adaptation of the specifications for engine bolt iron of the American Society for Testing Materials. It is stipulated that the iron shall be made wholly from puddled iron or "knobbed charcoal iron." The tensile strength is put at 48,000 to 52,000 lb., against a range of 50,000 to 54,000 lb. under the American Society for Testing Materials specification. Under cold bend tests it is stipulated that the specimen shall bend cold through 180 deg. flat on itself, without cracking on the outside of the bent portion. Under permissible variations, it is laid down that the gauge of each bar shall not vary more than 0.01 in. from that specified.

The specifications for staybolt iron are identical with those of the American Society for Testing Materials, and the specifications for refined wrought iron bars are similar to those of the American Society for Testing Materials. The permissible variations of round bars conform to the standard limit gauges adapted by the Master Car Builders' Association, as given in the following table:

Permissible Variations in Gauge for Round Wrought-Iron Bars

Nominal diameter, in.	Maximum diameter, in.	Minimum diameter, in.	Total variation, in.
$\frac{1}{4}$	0.2550	0.2450	0.010
$\frac{5}{16}$	0.3150	0.3070	0.011
$\frac{3}{8}$	0.3870	0.3800	0.012
$\frac{7}{16}$	0.4440	0.4310	0.013
$\frac{1}{2}$	0.5070	0.4930	0.014
$\frac{9}{16}$	0.5700	0.5550	0.015
$\frac{5}{8}$	0.6330	0.6170	0.016
$\frac{3}{4}$	0.7585	0.7415	0.017
$\frac{7}{8}$	0.8840	0.8660	0.018
1	1.0095	0.9905	0.019
$1\frac{1}{8}$	1.1350	1.1150	0.020
$1\frac{1}{4}$	1.2605	1.2395	0.021

The widths or thicknesses of flat bars shall not vary more than 2 per cent. from that specified.

### Joint Meeting of Philadelphia Foundrymen and Foremen

The Philadelphia Foundrymen's Association and the Associated Foundry Foremen of Philadelphia held a joint session on the regular meeting night of the former organization, at the Manufacturers' Club, in Philadelphia, Wednesday, March 4. Thomas Devlin presided. On February 16 about 500 foundrymen, foundry foremen and their friends attended a service at the Sunday tabernacle. Secretary Howard Evans reported that on that occasion the Foundrymen's Association presented Mr. Sunday with a Parker hammerless shotgun.

David Townsend, M.E., president of the Production Engineering Company, Philadelphia, read the paper of the evening on "Putting the Cupola on a Scientific Basis." It is given nearly in full elsewhere in this issue. It was brought out in the discussion that the application of the procedure advocated—the use of waste cupola gases to preheat the blast and other refinements tending to give regularity and economy in cupola operation—would be practicable only where the operation of the cupola was substantially continuous, as in cast-iron pipe and wheel foundries. Constancy of blast temperature and volume, it was admitted, is a desideratum, and the point was made that builders of cupolas do not apply scientific methods to this very important piece of foundry apparatus. Back of this was the fact that most foundrymen aim to install a cupola at low cost.



# No Victory Over Scientific Management

Riders to Appropriation Bills Not to Work  
as Management Opponents Desired—Con-  
cessions by Congress to Labor Prove Small

WASHINGTON, D. C., March 9, 1915.—Under the high tension of the closing hours of Congress, which adjourned at noon on March 4, the Senate made a complete surrender to the House in the matter of the prohibition of the use of the so-called Taylor time-study and premium system in certain government establishments. The story of the passage of the naval bill carrying the prohibition was briefly told in this correspondence last week. The conference committee having the naval bill in charge was besieged by members of the House, who declared that their political future depended upon the retention of the prohibition against the introduction of scientific shop management in government establishments, and the conferees were thereby induced to resist the demand of the Senate for the elimination of the prohibition until the hour of final adjournment was so close at hand that the passage of the bill itself was imperiled and the Senate reluctantly yielded its position.

The fate of the naval bill naturally foreshadowed the action on the army bill, although the sentiment in the Senate in favor of striking out the prohibition of scientific shop management was stronger with respect to the military establishments, for the reason that the War Department has strenuously advocated the Taylor system and the military committee of the Senate, acting upon the recommendations of Secretary Garrison and General Crozier, chief of the War Ordnance Bureau, had reported against the House amendment. The situation was also influenced to some extent by the understanding that the Secretary of the Navy was personally opposed to the introduction of scientific shop management systems in navy yards and naval gun foundries. Soon after the conference report on the naval bill was adopted by both houses the Senate conferees on the army bill announced that they would no longer stand out against their colleagues, and the bill carrying the House prohibition was therefore hastily reported and passed.

## BARREN VICTORY FOR LABOR LEADERS

The victory of the labor leaders, however, is a barren one, at least so far as its effect upon the conduct of government establishments during the next 16 months is concerned. Aside from moral effects the prohibitions will accomplish nothing. So far as the naval service is concerned the time-study and premium systems have never been employed either in yards or foundries.

The prohibition of the army bill relates only to the use of funds carried by the army bill. As this measure does not become operative until July 1 one of the first official acts of the chief of ordnance following the passage of the army bill was to reinstate the Taylor time-study and premium system at the Watertown arsenal, where it had been suspended during debate on the army bill in Congress in order that the employees might receive an object lesson as to the effect of the proposed prohibition. The system will be maintained in full force at the arsenal until June 30. In the second place the labor leaders appear to have overlooked the fact that all the premiums paid on work at the Watertown arsenal, amounting to some \$45,000 per annum, have been taken from the funds provided by the annual fortifications appropriation bill. This important measure, carrying an increased sum for the fiscal year beginning July 1, was passed by Congress without any restriction with reference to premiums, hence the prohibition in the army bill against the use of funds provided by that measure for the payment of "any premium or bonus or cash reward" becomes a dead letter.

## HOW SCIENTIFIC MANAGEMENT IS RETAINED

All that is left of the prohibition as it applies to Watertown is the requirement that no part of the ap-

propriation shall be paid for the salary or pay of any officer, manager, superintendent, etc., having charge of the work of any employee "while making or causing to be made, with a stop-watch or other time-measuring device, a time study of any job of any such employee between the starting and the completion thereof or of the movements of any such employee while engaged upon such work." The Taylor system has been in use at Watertown for several years, and in that period time studies have been made of practically every job undertaken in the arsenal, hence the management has accumulated data to continue the premium system without further time studies except such as might be required for new work presenting novel mechanical problems. After a careful examination of the language employed in the prohibition it has been decided that it in no way prevents the "routing" of work or the use of numberless other methods of scientific shop management which experience under the Taylor system has suggested; also that, although the law prohibits a time study of a job "between the starting and completion thereof," it does not prohibit a time study of the job as a whole. Altogether, therefore, the ordnance bureau anticipates little or no inconvenience at Watertown as a result of the provision contained in the army bill, and it is confidently hoped that before Congress takes up the next military budget better information and a change in public sentiment will prevent the re-enactment of such ill-advised legislation.

## PIECE WORK AT FRANKFORD ARSENAL

The situation at the Frankford, Pa., arsenal differs materially from that at Watertown. Time studies have never been made at Frankford, but a premium system, based upon a day's wage calculated as a fair performance, has been in operation and will be affected by the prohibition, inasmuch as the payroll of this arsenal is provided from funds carried by the army bill. The work at Frankford, however, is largely repetition, including the production of great quantities of ammunition, etc., which lends itself readily to the piecework system. It will be possible, therefore, for the government to reward diligent employees by compensating them upon a piecework basis, but the workers will lose the advantage which they have heretofore enjoyed of a basic minimum wage paid to them without regard to their individual performances.

## INFLUENCE OF ORGANIZATION IN LABOR

It is highly significant that while as the result of pressure brought to bear upon them by the labor leaders the employees of the Watertown arsenal, who are practically all organized, have permitted collective protests against the Taylor system to be filed in their behalf—although individuals have written letters to Senators and Representatives expressing their satisfaction with existing conditions—the employees at Frankford, where there is little or no organization, have unanimously indorsed the premium system in a memorial forwarded to Senator Oliver and presented by him at the final discussion of the army bill in the Senate. This memorial, prepared by a committee of employees, specifically contradicts practically every allegation made by the opponents of scientific shop management systems, as the following extracts will show:

The committee most emphatically informs you that the earnings referred to have been made by the skill, application and industry of the employees whom we represent. We most emphatically deny that we have been driven or speeded up or worked beyond our capacity. Not a single employee operating under the premium system, although it has been in force for about five years, has been obliged to give up his or her position due to operating under such a system owing to any physical breakdown. We do say, however, that we apply

ourselves to our work and waste no time about the shops. This committee represents about 450 employees engaged in the manufacture of small-arms ammunition under the bonus or premium system, and we know that we are telling you the truth when we make this statement.

We understand that the bonus and premium earned by us annually amounts to about \$45,000, and we are confident in stating that in case of other departments at the arsenal there is probably an additional premium or bonus paid to the employees to the extent of at least \$6000 annually. It may be stated, therefore, that the sum of \$51,000 at least is paid annually by the government for the increased efficient service which we give to it, and we appreciate such acknowledgment of the service that we render.

Based on our increased earnings under the system referred to many of us have taken on obligations by way of purchasing homes or investing our savings in building and loan associations, and we feel that if we are deprived of the opportunity to make such earnings we may lose our homes or other investments on which we have made partial payments.

#### TO PROHIBIT TAYLOR SYSTEM IN SHOPS SUPPLYING THE GOVERNMENT

Business men rarely express their views on these matters to their Senators and Representatives. They should understand, however, that provisions affecting only the government service will likely, in the absence of organized opposition, soon be extended to private establishments through the incorporation in government contracts of clauses prohibiting purchases from manufacturers who do not operate their plants under exactly the same conditions enforced in government institutions. Experience with the eight-hour day problem is a fair illustration, and it is well understood that the next demand will be the prohibition of purchases of goods made in shops where the Taylor system or anything approximating it is in use.

W. L. C.

#### Cleveland Metal Trades Association

The Cleveland Branch of the National Metal Trades Association, Cleveland, Ohio, at its annual meeting March 4, decided to become a more active organization and to hold meetings more frequently. It was recommended that the executive committee arrange a series of meetings accordingly. The superintendents and foremen of the factories will be invited to attend one or more of these meetings. The increased activity of the branch is partly due to the better business conditions and partly to the increased activity of some of the labor organizations. Various matters were discussed at the meeting, including the subjects of labor, legislation and the work of the employment bureau conducted by the branch. The reports of the officers showed that the branch is in very good condition. The treasurer's report showed that there is no indebtedness, with a fair cash balance. Officers were elected for the ensuing year as follows: President, Christian Girl, Perfection Spring Company; vice-president, Franklin Schneider, Van Dorn & Dutton Company; treasurer, J. D. Cox, Jr., Cleveland Twist Drill Company. Executive committee: J. H. Francis, Kilby Mfg. Company; H. P. Souther, Ferro Machine & Foundry Company; N. S. Calhoun, Johnston & Jennings Company; A. W. Foote, Foote-Burt Company.

#### Waste Material Dealers to Meet

The National Association of Waste Material Dealers will hold its second annual meeting at the Hotel Astor, New York, March 16, at 2 p.m. The election of officers for the new year will take place at this time. The nominating committee has named for re-election all the old officers except the sixth vice-president, for which position P. Walsh, Jr., is recommended, succeeding William S. Buxton. The second annual banquet will be held in the evening, preceded by a reception. On Monday, prior to the annual meeting, the Metal Division will hold a meeting at 2 p.m. The chairman of the Metal Division is Clarence B. White, Philadelphia. Chairman White announces that as important matters are to be taken up he hopes for a large attendance.

The American Anti-Boycott Association, H. F. Lee, secretary, held its annual dinner at the Waldorf-Astoria, New York, Friday evening, March 5.

#### Pittsburgh and Nearby Districts

The Pennsylvania Engineering Works, New Castle, Pa., has received an order from the Carnegie Steel Company for the building of a 1000-ton metal mixer and a structural steel building, 65 x 110 ft., 80 ft. high, to contain the mixer; also a 75-ton crane and 15 50-ton hot metal cars. The total equipment will cost about \$200,000 and will take seven months to complete. It will be installed in the New Castle open-hearth steel works of the Carnegie Company.

The Pittsburgh Trolley & Forge Company, Pittsburgh, has taken a contract from the United States Government to supply wicket irons for dams in the Monogahela River and also in the Ohio River at Carrollton and Steubenville, Ohio, and Wheeling, W. Va.

No. 1 blast furnace of the Carnegie Steel Company at the Ohio works, Youngstown, Ohio, was blown in on Monday, March 8. All six blast furnaces at this plant are now running for the first time in more than a year.

The 20-in. bar mill of the Republic Iron & Steel Company at Youngstown, Ohio, was put in operation on Monday, March 8. This week the Bessemer and open-hearth steel plants and the finishing mills of the company are in operation to nearly full capacity, and all its blast furnaces at Youngstown are going. The company is turning out a greater product than for a long time.

The skelp mills at the works of the Carnegie Steel Company, at Farrell, Pa., which have not operated for some months, are scheduled to start work on Sunday evening, March 14. No. 2 blast furnace at Farrell has been banked and No. 3 stack has started up. The Farrell works are now operating to larger capacity than for some months, 10 of the 12 open-hearth furnaces being in operation.

The Wm. B. Scaife & Sons Company, Pittsburgh, has received a contract from the Duff Mfg. Company, Preble avenue, Pittsburgh, for the erection of a paint shop of steel construction covered with corrugated iron.

Directors of the Youngstown Sheet & Tube Company, Youngstown, Ohio, have asked the stockholders to authorize an increase in the preferred stock from \$5,000,000 to \$10,000,000, at a meeting to be held April 6. It is the intention to erect four batteries of 51 by-product coke ovens each, or 204 in all, to have a daily output of 2200 tons of coke, and thus fully supply the four blast furnaces. The type of oven has not been decided upon. While definite plans have not been made, it is likely eight more sheet mills will be added and possibly one or two new lines of product will be engaged in.

The Republic Iron & Steel Company, Youngstown, Ohio, which is considering the addition of a benzol plant to its by-product coke ovens, has not as yet come to a definite decision, but it is likely that the plant will be built.

The Bessemer and open-hearth steel departments and the finishing mills of the Youngstown Sheet & Tube Company, Youngstown, Ohio, are all in full operation this week, with the exception of two tube mills. This plant is now being operated to greater capacity than at any time for some months.

#### Blast Furnace Notes

Furnace No. 8 at South works, Illinois Steel Company, was blown out February 9, for relining.

The blast furnace of the Canada Furnace Company, Ltd., at Port Colborne, Ont., which has been idle for several months, was blown in this week.

The furnace of the Struthers Furnace Company at Struthers, Ohio, which was blown out February 4 because of an accident to the bell, is again in operation.

The Chicago, Milwaukee & St. Paul has ordered nine 260-ton electric locomotives from the General Electric Company. They are to be used on the second engine division of the new electric line from Three Forks, Mont., to Harlowton.



## NEW GERMAN STEEL SYNDICATE

### A Proposal Which Would Include "B" Products on an Ingot Basis

Based upon information in German papers, the London Iron and Coal Trades Review gives the following regarding the plans that are being formulated and discussed in that country for establishing a new German steel syndicate:

It seems rather inappropriate at the present time to bring forward a new scheme for the consolidation of the steel industry of Germany, especially as the negotiations for the renewed syndication of bars, wire rods, plates and sheets, tubes, and castings and forgings were suspended on the outbreak of the war. Yet this fact has not deterred T. Muller, general director of the firm of Gebrüder Stumm, from preparing a new project which is now engaging the attention of steel-trade circles in that country.

#### DETAILS OF TONNAGE ALLOTMENTS

The author of the scheme submits that before entering upon negotiations in regard to sales organizations, the essential preliminary condition for the creation of syndicates is that the most important and difficult question of tonnage allotments must be settled first and for all products simultaneously and according to the same formula. This formula was found in connection with the last negotiations undertaken for the syndication of bar iron, and when applied to the entire production of steel ingots it would not impose any sacrifice on anyone. The formula runs: Each works receives an allotment for all B products (the six classes mentioned above), the quantity of ingots which results from the production of ingots in 12 months in succession between January 1, 1912, to April 30, 1914, reduced by the output of ingots for A products (semi-finished steel, railroad material and shapes) in the existing Steel Syndicate. The distribution of the then remaining quantity of ingots among the individual groups of B products would take place in proportion to the deliveries in these groups in the 12 months selected for the purpose. The adoption of the formula would therefore solve the allotment question for all B products.

#### A STEEL-INGOT ASSOCIATION

A not inconsiderable difficulty, however, would arise. It is suggested that the syndicates should be established for from eight to 10 years, but the present agreement of the Steel Syndicate will expire on June 30, 1917. If, therefore, syndicates for B products were formed for 10 years difficulties would be expected to arise, as is shown by experience, in 1917 when again fixing the allotments for the A products, and these might prove to be incapable of solution. The author therefore considers that the formula should be applied to all steel products in order that a practical basis could be given for the allotment tonnages for a long period of years. He suggests the advisability of forming a steel-ingot association, an important object of which would be to establish the necessary organic connection between the individual syndicates in order to prevent—what is almost the rule under the present complicated situation—the interests of one syndicate from militating against those of another.

#### SELLING AFTER THE WAR

The new ingot association would also have to examine the question as to whether, on the conclusion of the war, it would still be advantageous to sell large quantities of semi-finished steel to England and Belgium, or whether the material should not be finished by the works and exported as manufactured products. A further object of the association would be to deal with the propaganda in other countries. Mr. Muller negatives the suggestion that under these circumstances it would be better to constitute a single syndicate for all products, on the ground that these are of such a varied kind and the markets for them so different that they could not all be controlled from one place. Moreover, separate syndicates would be able to move more freely. He suggests that efforts should be put forth to reach an

agreement which would only regulate the production of ingots and promote the sale of ingots, leaving the sales organizations to form the subject of further agreements. Mr. Muller contends that this method promises to greatly shorten the process of negotiation, for if it is impossible to conclude an understanding in regard to an ingot agreement—that is, the allotment tonnages—any further negotiations could be abandoned.

#### OBLIGATIONS OF MEMBERS

The proposed statutes suggest that the association should be entitled the Ingot Syndicate, its object being to regulate the production of ingots of all kinds, to divide this output between the A and B groups, and to promote sales both in the home market and abroad. It is provided that no member shall produce a greater tonnage than his allotment in any one year, any excess being subject to a financial penalty. On the other hand, compensation is to be paid to any constituent whose production is less than his allotment. The question of the "protection of production" is to be settled in a special manner.

Thus the members are to undertake the obligation during the period of the agreement not to begin the manufacture of any rolled products in which they have no allotment, and not to participate either directly or indirectly in any other undertakings which do not belong to the Syndicate but which turn out such products. In addition, the members are to be placed under the obligation not to sell or deliver material to works which are not constituents of the Syndicate, through the working up of which fresh competition would be offered to one of the groups of the Syndicate. But members themselves have the right to form groups of products in so far as no disadvantage is incurred by the other constituents. In conclusion, the scheme proposes the formation of a special committee for the promotion of sales, who would confer with the Ingot Syndicate in regard to all measures to be taken for the cultivation of sales.

#### Attitude of Steel Companies Toward the Plan

All the German steel works sympathize with the proposed syndicate formations referred to above. It is objected, however, that the present is not a favorable time for negotiations. It is suggested that economic conditions will have changed after the war, rendering it difficult for plants to estimate their output for the next 10 years as based on one year's recent production; that the provision that no plant shall take up the manufacture of any new product in the life of the syndicate, would make it impossible to adapt the output of "B" products to any changes in the market's requirements. Control of the entire raw steel output is favored, but whether the new syndicate should be based on the pooling of the raw steel output of all the German steel plants, whether the Steel Works Union be taken as a basis, and whether the object should be to extend the union's operations are questions causing differences of opinion. All agree, however, that the unrestricted output of "B" products, as under the old "B" products agreement, should be prevented by fixing the total raw steel output of every member of the syndicate.

#### American Railway Engineering Meeting

The sixteenth annual convention of the American Railway Engineering Association will be held at the Congress Hotel, Chicago, convening at 9.30 Tuesday morning, March 16. The customary four-day convention is to be held, concluding Friday with an inspection of the National Railway Appliance Exhibition at the Coliseum and Armory. Reports on iron and steel structures will be made on Wednesday and the bulletin on rails will be discussed on Thursday.

The Sprague Electric Works of General Electric Company has recently opened a branch sales office at Cleveland, Ohio, in the Illuminating Building. It will be in charge of Frank H. Hill, manager, who also has charge of the Pittsburgh office.

## OBITUARY

**WILLIAM J. WETSTEIN** died March 3 in St. Luke's Hospital, St. Louis, Mo., aged 64 years. He was born at Louisville, Ky., and his first business connection was with Lawson & Co. of Cincinnati, Ohio. From 1886 to 1891 he represented the Cleveland Rolling Mill Company in Kansas City, Mo. Removing to St. Louis in 1891, he acted as sales manager until 1900 for the Apollo Iron & Steel Company, Cleveland Rolling Mill Company, Sharon Steel Company and Tennessee Coal, Iron & Railroad Company. When the American Sheet Steel Company was formed in 1900, Mr. Wetstein became its manager of sales in the St. Louis district, and when the American Sheet Steel Company and the American Tin-Plate Company were consolidated into the American Sheet & Tin Plate Company he was continued as manager of sales, which position he filled with great satisfaction to his employers until his decease. In the death of Mr. Wetstein the sheet and tin-plate trade of the country has lost one of its oldest and most honored members. J. I. Andrews, manager of sales of the American Sheet & Tin Plate Company, Pittsburgh, attended the funeral.

**WILLIAM ARNOTT WILSON** died at the St. Francis Hospital, Pittsburgh, Pa., March 5, aged 48 years. He was born at Plymouth, Pa., and began his professional life as a civil and mining engineer with the Lehigh Valley Railroad. He went to Greensburg, Pa., in 1891, as chief mining engineer for coal companies in that city which have since been merged into the corporation known as the Keystone Coal & Coke Company. With his father-in-law, in 1898 he organized and built the property of the Donohoe Coke Company. In 1901 he organized the Mount Pleasant Coke Company, following this by the organization of the Veteran Coke Company and the Mount Pleasant-Connellsville Coke Company, of which companies he has always been manager and principal owner, and he placed a coking operation on a 1000-acre property of the estate of the late William Thaw, Pittsburgh.

**WILLIAM HORSBURGH**, associated with the Horsburgh & Scott Company, Cleveland, Ohio, gear manufacturer, of which his brother Frank is president, died March 8 from apoplexy, aged 65 years.

**F. FELKEL**, member of the firm of F. Felkel & Son, architects and engineers, Pittsburgh, died February 25 from pneumonia, after a short illness.

### Cincinnati Metal Trades Association

The Cincinnati Branch of the National Metal Trades Association held its annual meeting at the Business Men's Club, Cincinnati, Ohio, on the evening of March 4. President Murray Shipley presided, and in his opening address emphasized the importance of co-operation between the members of the association.

Secretary J. M. Manley's report was comprehensive and interesting. After reviewing the work of the association in the past year, he went over in detail the objectionable features of a number of bills now before the Ohio Legislature, calling particular attention to House bill No. 190, known as the anti-injunction bill. The American Federation of Labor is making a strenuous effort to have this placed on the statute books of all states. As 43 legislatures will convene this year, he said, the importance of blocking this movement is a matter that should be of no small concern to all employers. The bill attempts to strip the courts of the State of the power to protect, by injunction, the right of the people to enter into or change the relation of employer and employee, or to carry on business in such relation with any person, or to do work or labor as an employee. It seeks to accomplish this by directing the courts not to construe such rights to be property rights, and by forbidding them to issue injunctions to protect anything but property so defined and limited.

The guest of the evening was John W. O'Leary, chairman of the Ways and Means Committee of the Chamber of Commerce, Chicago, Ill., who appealed to

the business men of the country to take more interest in government matters. Benjamin Sebastian, who followed Mr. O'Leary, referred to the history of the association, and in reviewing its work paid a high tribute to previous officers as well as those now in charge. B. B. Quillen, chairman of the nominating committee, presented a report, which was adopted, nominating the following officers: President, Murray Shipley (second term); vice-president, J. B. Doan; treasurer, A. J. Jones; secretary, R. W. Eagan. Executive committee, C. H. Fox, William Hermann and N. B. Chace. J. M. Manley will continue in charge of the business affairs of the association.

### Lake Superior Iron Ore in 1914

The publication of the shipments of Lake Superior iron ore by mines in 1914 by the Iron Trade Review shows a total of 32,729,726 tons as against 49,947,116 tons in 1913, a decrease of 17,217,390 tons, or 34.47 per cent. The all-rail shipments were 707,829 tons, this amount being added to the Lake shipments, which were compiled by *The Iron Age* at the close of navigation and appeared in our issue of December 3, 1914. The shipments by ranges for four years were as follows in gross tons:

	1914	1913	1912	1911
Marquette .....	2,491,857	3,966,680	4,202,308	2,833,116
Menominee .....	3,221,258	4,965,604	4,711,440	3,911,174
Gogebic .....	3,568,482	4,531,558	5,006,266	2,603,318
Vermillion .....	1,016,993	1,566,600	1,844,981	1,088,330
Mesaba .....	21,465,967	34,038,643	32,047,409	22,093,532
Cuyuna .....	859,404	733,021	305,111	147,431
Miscellaneous .....	105,765	145,010	104,031	115,629
Total .....	32,729,726	49,947,116	48,221,546	32,793,130

For the third successive year the Steel Corporation's share of the total shipments has been less than half of the tonnage. Its percentage in 1914 was 49.01; in 1913, 49.06; in 1912, 49.46 and in 1911, 52.70. Its highest percentage was 56 in 1907. The amount of ore taken out last year on the Steel Corporation's Great Northern lease, which was surrendered at the close of 1914, is put at 6,013,758 tons, against the 6,525,000 tons remaining to be taken out before the surrender of the lease.

The Mesaba range percentage of the total shipment was 65.62 in 1914 against 68.15 in 1913, 66.46 in 1912 and 67.37 in 1911. The Cuyuna range shipped 859,404 tons last year or 17.24 per cent. more than it did in 1913 and nearly three times more than it did in 1912.

There were 16 new shipping mines last year as against 20 in 1913, and 13 in 1912, 12 in 1911 and 16 in 1910. Ten of the new mines were located on the Mesaba range and four on the Menominee. Two mines which have been idle for years resumed shipments in 1914. The total of shipping mines in 1914 was 196 against 223 in 1913.

On the Canadian side the Helen mine and the Magpie, both of the Lake Superior Corporation, shipped 80,860 tons and 98,070 tons, respectively, against 42,550 and 19,934 tons for these two mines in 1913. Moose Mountain mine shipped 29,457 tons against 102,238 tons in 1913. None of the Canadian outputs is included in the accompanying table.

### Aluminum Bronze Gaining Favor

W. M. Corse, manager of the bronze department of the Titanium Alloy Mfg. Company, Niagara Falls, N. Y., points out that the high price now asked for spelter, which forms about 42 per cent. of the contents of manganese bronze, has made feasible the substitution of aluminum bronze for the manganese alloy. The cost of spelter has forced the price of manganese bronze to a higher point than at any time in the past few years. The present price of aluminum, on the other hand, is approximately as low as it has ever been in a like period. Mr. Corse says that if the rise in spelter continues a substantial saving can be effected by the use of aluminum bronze instead of manganese bronze. The former is about 10 per cent. lighter. The Titanium Alloy Mfg. Company, in the making of aluminum bronze, uses special processes, including the use of titanium as a deoxidizer, which overcomes difficulties heretofore encountered.



## Judicial Decisions

ABSTRACTED BY A. L. H. STREET

**PATENT ROYALTY CONTRACTS.**—A contract by a manufacturer to pay an inventor royalties on his procuring patents on a device and assigning them to the manufacturer does not preclude the latter from making a similar contract with another inventor covering an appliance to be used for the same purpose. (Illinois Supreme Court, *Forster vs. Brown Hoisting Machinery Company*, 107 Northeastern Reporter 588.)

**CHOICE OF DANGEROUS WAY BY EMPLOYEE.**—A foundry employee who was injured by falling into a pit in wheeling sand cannot recover against his employer, if his choice of a dangerous passage way caused the accident, and there was, to his knowledge, a safe way. (United States Circuit Court of Appeals, Third Circuit *American Car & Foundry Company vs. Duke*, 218 Federal Reporter 437.)

**DUTY TO WARN EMPLOYEE.**—An employee in a steel company's plant, who was injured through swinging of a chute when a supporting prop fell, is entitled to recover against the company, if he was directed to go near the chute and was not warned of the danger to which he was subjected, especially where the chute could have been secured in a safer manner, and he did not appreciate the risk. (Kentucky Court of Appeals, *Myers vs. Andrews Steel Company*, 172 Southwestern Reporter 663.)

**COMPANY'S RIGHT TO USE EMPLOYEE'S INVENTION.**—A foundry company has an implied license to use an invention perfected by its manager, where it appears that much of the labor performed in perfecting the device was done by the company's employee and at its expense; that he caused changes to be made in the company's plant to facilitate manufacture of the device, and made a contract in the company's name for manufacture embracing the patented feature. (United States District Court, District of New Jersey, *Schmidt vs. Central Foundry Company*, 218 Federal Reporter 466.)

**TEST OF EXISTENCE OF MONOPOLY.**—A manufacturer does not render himself guilty of an unlawful restraint of trade through the mere fact that the increased volume of his business hampers small competitors, unless the growth has resulted from fraudulent, unfair, or oppressive measures against competitors, in the matter of fixing prices, limiting production, deteriorating the quality of an article produced for the same price or by arbitrarily reducing the wages of employees, or the price of raw material. (United States District Court, Eastern District of Pennsylvania, *United States vs. Keystone Watch Case Company*, 218 Federal Reporter 502.)

**RIGHT TO SUE UNDER ANTI-TRUST ACT.**—There is no private right of action for violation of the Federal anti-trust law in the absence of proof that plaintiff has been actually damaged by defendant's unlawful acts. (United States Circuit Court of Appeals, Second Circuit, *Locker vs. American Tobacco Company*, 218 Federal Reporter 447.)

**STATE'S RIGHT TO TAX NON-RESIDENT CORPORATIONS.**—Although it is within the power of a State to impose a tax against foreign corporations who do intrastate business within its borders, no tax may be based upon property of companies engaged in interstate commerce or situated in other States. Therefore, the laws of Texas are unconstitutional so far as they purport to levy a franchise tax against such corporations based upon their capital and surplus. (United States District Court, Northern District of Texas, *Crane Company vs. Looney*, 218 Federal Reporter 260.)

**WARRANTY NOT IMPLIED IN SALE OF MACHINERY.**—A machinery manufacturer, in selling a machine of his make with an attachment made by another manufacturer, who does not guarantee it, does not impliedly warrant the adaptability of the attachment to the use for which the selling manufacturer knows it is being purchased. (United Circuit Court of Appeals, Fifth Circuit, *People's Light Company vs. Rathbun-Jones Engineering Company*, 218 Federal Reporter 167.)

**LOCAL TRANSACTION BY NON-RESIDENT CORPORATION.**—A non-resident machinery corporation "does busi-

ness" within a State, so as to become subject to laws of that State regulating transaction of local business by foreign corporation, when it contracts to install a manufacturing plant in the State, the labor being paid for by the purchaser, but performed under the supervision of the company's engineer who is directed not to turn it over to the purchaser until its formal acceptance by the latter in writing. (Texas Court of Civil Appeals, *York Mfg. Company vs. Colley*, 172 Southwestern Reporter 206.)

**EMPLOYER'S DUTY TO AFFORD SAFE MEANS OF EGRESS.**—An employer whose plant is so located that his employees in going to and returning from work are required to cross railroad tracks upon which trains are frequently and rapidly passing must maintain a watchman, or adopt other suitable means of warning the employees against danger. (New York Supreme Court, Appellate Division, *Patrick vs. Atlas Knitting Company*, 149 New York Supplement 845.)

**SAFETY OF CRANE APPLIANCES.**—A foundry employee engaged to do work near a traveling crane was entitled to have his employer use a reasonable degree of care to see that the grab was in a reasonably safe condition, so as to avoid injury to the employee through fall of a load. If such an appliance is defective, the employer cannot avoid liability for injury by showing that another employee had been directed to operate it in a manner which would not cause an accident, and failed to follow such instructions. (Wisconsin Supreme Court, *Czapinski vs. Thomas Furnace Company*, 149 Northwestern Reporter 477.)

**UNREASONABLE DELAYS IN DELIVERY.**—Under an agreement for a sale of a quantity of pig iron to be shipped from Birmingham, Ala., to Philadelphia during the months of April and May, the buyer is not required to receive a shipment tendered in December, in the absence of any explanation of the cause of the delay, which will be deemed an unreasonably long time for making delivery. (Sloss-Sheffield Steel & Iron Company vs. Tacony Iron Company, 54 Pennsylvania Superior Court Reports 11.)

**RIGHTS OF CORPORATION'S SUCCESSOR.**—When a manufacturing corporation is dissolved and another company purchases all of its assets, the latter is entitled to use the name of the old corporation in such way as to indicate that it is the successor to the business, and is entitled to enjoin a competitor from using a trademark which had been exclusively used by the old company. (New York Supreme Court, New York County Special Term, *R. J. Horner & Co. vs. Lawrence*, 149 New York Supplement 282.)

**MACHINERY MANUFACTURER AS SUBCONTRACTOR.**—A company which took a subcontract for installation of boilers and a mechanical stoker in a power plant with knowledge of the specifications contained in the principal contract, is bound by a provision in such specifications making the decision of a city inspector conclusive as to the amount, quality and acceptability of work done. Such decision may, however, be set aside on the ground that it was given under fraud or mistake operating to the prejudice of the subcontractor. (Maryland Court of Appeals, *Hughes vs. Model Stoker Company*, 92 Atlantic Reporter 845.)

**GUARANTEE OF PAYMENT OF ACCOUNTS.**—Where a company sold supplies to a plumbing concern under a guarantee of payment made by third parties, there could be no recovery against the guarantors, if time for payment of the account was extended without their consent, the plumbing concern having become insolvent during the period of extension. (Virginia Supreme Court of Appeals, *Carson vs. J. L. Mott Iron Works*, 84 South-eastern Reporter 12.)

**ACCEPTANCE OF ORDERS.**—One who gave a manufacturer's traveling salesman an order for appliances, on an oral understanding that the order should be canceled unless filled within two weeks, was entitled to refuse to receive a delivery made 30 days after the order was taken. And, even when no time for delivery is expressed, an order not accepted within a reasonable time releases the buyer from obligation to accept delivery when afterwards made. (Minnesota Supreme Court, *S. F. Bowser & Co. vs. Fountain*, 150 Northwestern Reporter 795.)

# Machinery Markets and News of the Works

With several types of machine tools, such as engine lathes, turret lathes, milling machines, etc., the great question now is how soon deliveries can be made, and not how orders can be obtained. Furthermore, the demand for metal working machines is spreading out and tools not heretofore favored are in steadily growing demand. For some classes of second-hand tools the demand is equally as good. New England lathe makers are deluged with orders. New York has closed some big propositions having to do with the making of shrapnel and projectiles and more are pending, one specifying no less than 1000 tools. In Cleveland the broadened effect of the demand is felt and business is good, radial drills being active as well as other machines. Activity is increasing in Detroit, both as regards orders and inquiries. Inability to secure early deliveries is causing some let-up in orders in Cincinnati, although the war is increasing demand for grinding machines and radial and sensitive drills. Chicago dealers cannot promise early deliveries on account of the crowded condition of the shops of machine tools builders. In Milwaukee no orders of especial size are reported, but the total makes a good showing. Considerable improvement is noted in the Central South, where boilers, ice machinery and wood-working equipment are in particularly good demand. Texas is feeling a much better demand for oil-well equipment, while general trade conditions are improving. In St. Louis some types of machine tools, especially lathes, are in short supply because of the big demand in the eastern states. On the Pacific coast the lumber industry is getting busier, and in addition some logging machinery has been sold for export to India. In San Francisco and vicinity the machine tool business is improving slowly.

## New York

NEW YORK, March 9, 1915.

Inquiries for machine tools for the manufacture of projectiles and other munitions of war, aggregating about 1000 tools, have been placed before the trade by the Crucible Steel Company of America. The majority of the machines wanted are engine lathes and they are to be used in the manufacture of projectiles ranging in diameter from 7 to 13 in. The purchasing of this great number of machines is contingent upon the steel company receiving an order, it is supposed from England, on which negotiations have been under way for some time. The company has prepared plans for a quick enlargement of its facilities, including the erection of a building which can be completed in 90 days.

The Baldwin Locomotive Works, Philadelphia, has an inquiry out for about 600 engine lathes. This company has been a heavy purchaser of machines for shipment to Russia and is known to have been figuring on the making in its own shops of shrapnel and projectiles.

The Traylor Engineering Company, Allentown, Pa., which recently bought a large number of machines, including about 80 large turret lathes and many other machines, has added to its purchases by contracting to take later deliveries of additional turret lathes and other machines. The company has a contract to supply Great Britain with 500,000 lyddite shells.

The Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., has placed an order for about 100 engine and turret lathes, on which delivery is to be made in four, six and eight weeks. They are to be used in making  $4\frac{1}{2}$ -in. quick-firing lyddite shells for one of the foreign governments. The company has been busy for some time making shrapnel blanks and rough-turning them for the Frankford Arsenal, Philadelphia, and for private companies.

The Westinghouse Air Brake Company, Wilmerding, Pa., is busy on lyddite shells, it is understood through the medium of a sub-contract.

The E. W. Bliss Company, Brooklyn, has increased its facilities by taking space in the Bush Terminal buildings, Brooklyn.

The big Russian shrapnel contract which was before this market several weeks ago, but which was not placed, is now generally understood to have been closed with Canadian manufacturers.

Dealers are extremely busy with the war demand and in addition are getting a good bit of business from other directions, including the automobile field. The Bijur Motor Lighting Company, Hoboken, N. J., recently bought a number of machines, including automatic screw machines and turret lathes. A company which has been importing automobiles is organizing to manufacture cars in the East and is inquiring for machinery. Some good business has been done in New England by the representatives of local firms. A visit to Eastern railroad car shops found them formulating plans to meet greater activity. The same is true of shipyards, though in their case they have many orders booked, while the car builders are still expectantly waiting for orders from the railroads.

The question of making deliveries of certain types of machines, particularly lathes, turrets and milling machines, in the next few months is more complex than ever. The situation is illustrated by the attitude of a prominent manufacturer in the Central West who said he would be as well pleased if

he did not get a large order, additional to those previously booked, inasmuch as it would give his factory a chance to partly catch up with deliveries. He also commented that the new men being taken on to take care of the rush are not as proficient as the older employees and that to guard against the possibility of an inferior product it was necessary to increase and make stricter the inspection of both parts and assembled machines.

The De La Vergne Machine Company, New York, maker of refrigerating apparatus, oil engines, sand-blast machines, etc., has just purchased several machine tools.

The Automobile Supply Mfg. Company, 220 Taaffe place, Brooklyn, N. Y., manufacturer of automobile accessories, states that it has not definitely decided to remove its business to a plant in New Jersey, as has been reported.

The Kebec Mfg. Corporation, 52 Broadway, New York, has been incorporated with a capital stock of \$10,000 to manufacture a patented boiler circulator. Morris Stettheimer is president, and Mortimer Stiefel, secretary.

The Stern-Coleman Diamond Machine Company, 136 West Fifty-second street, New York, has increased its capital from \$150,000 to \$515,000, but does not plan to use any of the additional capital for new machinery.

The Harris, Silvers, Baker Company, structural steel contractor and engineer, Clay street and Paidge avenue, Brooklyn, N. Y., plans to erect a factory at South Plainfield, N. J. The company has no definite information at this time regarding its building plan. George M. Harris is president.

T. G. Hawkes & Co., Corning, N. Y., have let contract for the erection of an addition, 63 x 70 ft., two stories and basement, to be made to its cut glass factory. Samuel Hawkes is president.

The Aristo Regulator Company, Jamestown, N. Y., has been incorporated with a capital stock of \$35,000 to manufacture special machinery and mechanical appliances. Gerald M. Pambleton, N. A. Johnson and Frank E. Clark, 311 Prendergast avenue, Jamestown, are the incorporators.

Incorporation papers have been filed by the N. C. Clausen Architectural Iron Company, Loudenville, N. Y. A machine shop will be equipped for the manufacture of architectural ornaments and other articles of iron, steel and brass. Nicholas C. Clausen, Joseph Bertrand and John B. Thiolonze are the incorporators.

The Carleton-Ruhe Company, Olean, N. Y., has filed articles of incorporation with a capital stock of \$50,000 to develop inventions and manufacture mechanical devices. C. Ruhe, G. A. Larkin and R. F. Cushing are the incorporators.

The Joseph Marcus Mt. Vernon Wood-Working Company has been incorporated with \$50,000 capitalization at Mt. Vernon, N. Y., to manufacture wood and lumber products, sash, doors, trim, etc. J. and A. M. Marcus and A. Forzberg, New Rochelle, are the incorporators.

The Crescent Tool Company, Jamestown, N. Y., will soon take bids for a new three-story factory, 50 x 106 ft., at an estimated cost of \$55,000.

The Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y., is building a brick and iron addition, 290 ft. long, to its plant at Military road and the New York Central Railroad.

William & Harvey Rowland, Inc., spring manufacturer, Tacony and Lewis streets, Philadelphia, is receiving bids for the construction of a one-story brick factory addition 50 x



275 ft. Ballinger & Perrot, 1211 Arch street, Philadelphia, are the architects.

The E. Keeler Company, Williamsport, Pa., was awarded contract for 18 water-tube boilers, by the Illinois State Board of Control, nine to be 300 hp. and nine 400 hp., all equipped with automatic stokers.

## New England

BOSTON, MASS., March 9, 1915.

Nothing has developed to modify the belief that business has permanently improved. The machine-tool builders are enjoying a continuance of orders growing out of the urgent demand for munitions of war in Europe. The shops that specialize on "turning machines"—lathes, automatics and grinding machines—are simply deluged with orders, which, if finally accepted, would mean long-time delivery. An engine lathe from 12 to 18 in. capacity is becoming a rare offering in the market. Second-hand machines of these classes are in much greater demand than they have been for years.

Some idea of the prosperous conditions existing in New England shops may be obtained from the fact that the Pratt & Whitney Company, Hartford, Conn., is now employing 2200 hands and the Reed-Prentice Company, Worcester, Mass., 1100. Both are records. The same condition exists with other concerns that manufacture these classes of machinery. In not a few cases equipment has been increased materially, and some building extension is planned beyond that already announced.

The iron foundries are very much busier than for a long time, and their buying of raw materials has increased correspondingly.

The Screw Machine Products Company, Providence, R. I., proposes to purchase some hand screw machines, plain milling machines and drilling machines. It is exceedingly busy, is operating its factory 14 hr. a day, and the prospect is that two shifts of workmen will be required. A very small percentage of this business is for war purposes, and that only indirectly. The demand, according to the company, is because of a more normal condition throughout the country. The output of these works, in common with others that manufacture screw machine products, enters into a very wide variety of industry.

The Winchester Repeating Arms Company, New Haven, Conn., manufacturer of rifles, shotguns and small arms ammunition, has started the erection of the largest of its group of additional buildings. The structure will be 56 x 646 ft., four and six stories high, of reinforced concrete. The cost will be \$350,000.

The Red Arrow Automobile Company, Orange, Mass., has awarded the contract for a fireproof factory which will be used for the manufacture of automobiles. The company states that it will be in the market for air compressor, pump, boiler, tank, and machinery, details of the requirements for which are not stated.

The Potter & Johnston Company, Pawtucket, R. I., has started the construction of an addition to its shops, 78 x 105 ft., one story.

The Torrington Mfg. Company, Torrington, Conn., has awarded the contract for a brick addition to its works, 90 x 120 ft., one story and basement.

The Hart & Cooley Company, New Britain, Conn., manufacturer of pressed steel registers and similar products, will build an addition 50 x 200 ft.

Baer Brothers, Stamford, Conn., will erect a one-story addition, 50 x 105 ft.

The Scovil Mfg. Company, Waterbury, Conn., brass manufacturer, has been given a building permit for the erection of an additional factory building, 80 x 100 ft.

The Avery Chemical Company, Wamesit, Mass., is erecting an additional four-story building.

The Bridgeport Brass Company, Bridgeport, Conn., has taken out a building permit for an additional story for the fireproof building now in process of construction on East Main street. According to the published annual statement the company has had a prosperous year, and its plant is working 64 hr. a week, or 10 hr. a week overtime.

The W. H. McElwain Company is planning the erection of an addition to its plant at South Manchester, N. H., to cost \$100,000.

The Clinton Wire Cloth Company, Clinton, Mass., will erect a building for the galvanizing department.

The Weir Stove Company, Taunton, Mass., contemplates the construction of a factory at the south end of the city.

The plant of the Torrey Bushing Company, Bath, Me., manufacturer of marine hardware and engines, sustained a fire loss of \$35,000 March 4.

## Chicago

CHICAGO, ILL., March 9, 1915.

The export situation still presents two large inquiries for machine tools unclosed in this market; but in other respects offers nothing new. Business secured from local manufacturers in the past week is variously reported as both good and bad. A number of instances where new shops of small size are being started is noted; and in some of these cases inquiries have already been received. Very little railroad inquiry has set in, the Santa Fe alone being in the market and for but one machine. It is understood that the Chicago & Northwestern Railroad has a list in preparation for improvements at its Boone, Iowa, shops. Local dealers continue to be handicapped by the crowded condition of the shops of the builders whom they represent. In some instances it is stated that promises on orders for stock offer little prior to September delivery.

The Chicago Steel Post Company, Chicago, has been organized with a capital stock of \$10,000 to manufacture steel posts and accessories, by T. Brooke Anderson, 208 South La Salle street.

The Superior Car Metal Roofing Company, Chicago, has been incorporated with a capital of \$25,000, to manufacture car roofs, doors, locks, etc. The incorporators are William H. Slatten, William F. Nolan, and E. A. Albright.

The Acme Printing Appliance Company, Chicago, organized with a capital of \$2000, will manufacture printing machinery and appliances. The incorporators are Alfred Pribilski, Hugo Kothe, 356 East Fifty-seventh street, and Otto A. Steineke.

The Breakstone Company, Chicago, has been granted a charter with a capital stock of \$6000 to conduct a business in automobiles, boats, gas engines, etc. The incorporators are Samuel Breakstone, 1436 South Michigan avenue; A. Griffin and J. F. Parks.

The All Metal Weather Strip Company, Chicago, has been organized with a capital of \$5000, to manufacture weather strips, etc., by John D. Peterson, 38 South Dearborn street; John C. Garriott and Marcena Black.

The Dearborn Steel & Iron Company, Chicago, has incorporated with a capital of \$2000 and will deal in steel products, specialties, etc. The incorporators are Robert H. Stoll, 38 South Dearborn street; E. L. Lyon and Peter J. Johnson.

The Chicago Conveyor Company, Chicago, has been incorporated with a capital of \$25,000, by Earle F. Tilley, 324 East Sixtieth street; J. P. Eames and W. H. Maclean.

The American Welding Company, 2637 South Michigan avenue, Chicago, has been incorporated with a capital stock of \$2500, to make oxy-acetylene welding and cutting outfits. The incorporators are Arthur J. Emrich, Anna J. Emrich and Charles Emrich.

The Chicago Faucet Company, maker of plumbers' supplies, 315 South Clinton street, Chicago, has had plans drawn for a foundry and machine shop, 25 x 50 ft., including office space, and is designed to carry an additional story. Hatzfeld & Knox, 7 South Dearborn street, are the architects.

The Oakland Garage, 821 East Thirty-ninth street, Chicago, is in the market for a 15 or 16-in x 8 ft. lathe, complete with full equipment.

The Haward-Bronaugh Company, Chicago, has been incorporated with a capital stock of \$10,000 by J. J. Guinan, 38 South Dearborn street; John W. McCarthy and C. F. Brown. It will deal in sheet metal, iron and steel devices, etc.

John Dye, mayor, Christopher, Ill., will take bids in May or June on a waterworks system to cost \$65,000, including intake pipe, mains and pumping equipment.

The Rockford Carbon Mfg. Company, Rockford, Ill., has been incorporated with an authorized capital of \$10,000 to manufacture carbons and carbon manufacturing machinery, electrical devices and apparatus. The incorporators are Fay Lewis, F. W. Williams and E. A. Poltras.

The Central Machine & Tool Company, Rockford, Ill., has been chartered with a capital stock of \$2500 to do a general engine and machinery business. The incorporators are George A. Daniels, John A. Linden and Harry B. North.

The Peerless Machine Works, Freeport, Ill., has decreased its capital stock from \$10,000 to \$5000.

The Rockford Drop Forge Company, Rockford, Ill., has increased its capital stock from \$100,000 to \$200,000.

The Conron Mfg. Company, Danville, Ill., has been incorporated with a capital stock of \$25,000, to manufacture castings, tools, etc. The organizers are T. W. Conron, F. E. Leseure and M. F. Keegan.

The Auto Supply & Accessories Company, Aurora, Ill., has been incorporated with a capital stock of \$15,000 by Edward H. Robinson, John A. Kremer and Fred E. Shearer.

The Pekin Cooperage Company, Pekin, Ill., has increased

its capital stock from \$500,000 to \$1,750,000 and will enlarge its business.

The Cabirange Stove Mfg. Company, Belleville, Ill., has completed plans for the erection of a plant. Gottlieb and Alvin Klemme, George Kloess and Julius J. Kohl are among the stockholders.

The Canadian Mineral Rubber Company is planning to resume operations at the old American Asphalt & Rubber Company's plant at Lawrenceville, Ill. New equipment will be added for the manufacture of a complete line of specialties; and the plant throughout will be brought thoroughly up to date.

Plans are under way for a new technical high school which will be built at Missouri Valley, Iowa, at a cost of \$80,000. It will be three stories, of concrete and brick, 90 x 140 ft. F. E. Colby, Sioux City, Iowa, is the architect. Plans will be ready for bids about April 15.

Linn Grove, Iowa, has voted \$9000 of bonds for a water-works system.

The Carter Motors Company, St. Louis, Mo., has been incorporated with a capital stock of \$3000 to purchase and manufacture engines, automobiles, etc. The incorporators are C. O. Baxter, A. H. Little and H. H. C. Weed.

The S. R. Sikes Company, Minneapolis, Minn., has awarded a contract for the construction of a three-story brick factory to Elson-Williams, 830 Hennepin avenue, Minneapolis.

The Duluth Ice Company, Duluth, Minn., is planning the erection of a factory, 110 x 175 ft., to be equipped with three 40-ton units of electrically-driven raw water ice-making machines. The factory will be located at St. Croix avenue and Buchanan street, and will be completed shortly.

## Milwaukee

MILWAUKEE, WIS., March 8, 1915.

The usual improvement in the domestic demand for machine tools as winter fades is becoming apparent. It furnishes the most encouraging feature of the situation in this district. Up to the beginning of March operations were for the most part on export account, but uncertainty accompanies such business, and relief is brought by an active inquiry and satisfactory bookings of tool orders from both nearby territory and further east. No orders of considerable size are being received but the total makes a good showing. Skilled help is being re-employed as rapidly as it presents itself. Special machinery builders are enjoying a fine run of new business from various sources, and makers of farm implements and machinery, including gas engines, are working to capacity. Most manufacturers are agreed that the revival has set in and is being accelerated from week to week.

The entire plant of the Kearney & Trecker Company, milling machines, West Allis, Milwaukee, has been operating on a 24-hour-per-day schedule for the last two weeks, which is likely to be maintained for several weeks. Daily shipments are being made on the large foreign order recently reported and domestic demand is improving rapidly.

The Federal Pressed Steel Company, Milwaukee, Wis., is in the market for two turret lathes.

The West Bend Aluminum Company, West Bend, Wis., is contemplating the erection of additional shop quarters during the second half of 1915. A large factory building was erected last summer and is rapidly being outgrown. More men are being added at this time.

The board of trustees of the Milwaukee public museum and library is in the market for two 110-hp. boilers. Bids close March 15.

The Stotzer Granite Company, 108 Mason street, Milwaukee, is about to erect an addition to its stone-working factory at Portage, Wis. The building will be 50 x 150 ft. and will be equipped with a 10-ton electric crane.

The Roughen Adjustable Paving Gauge Company, Fond du Lac, Wis., is erecting a factory, 50 x 70 ft., at 62 East Scott street, for the production of a line of metal and frame appliances for use in paving. Patrick Roughen is president.

Bids close March 16 for equipment for the new municipal electric light plant for the village of Windom, Minn. Contract 1 calls for one 125-hp. boiler, one 75 and one 100-kw. engine generator unit, with accessories. W. M. Hale is village clerk.

The Manitowoc Shipbuilding & Dry Dock Company, Manitowoc, Wis., has been awarded the general contract for rebuilding the steel steamer City of Chicago of the Graham & Norton Line, at \$150,000. The steamer was badly damaged by fire last summer.

The Four Wheel Drive Automobile Company, Clintonville, Wis., is installing about \$25,000 worth of new machinery and equipment to facilitate the production of an order for 130

three-ton motor trucks on foreign account. Additional equipment is being purchased as needed. The contract is claimed to involve something more than \$600,000.

Plans for the proposed cold storage, packing and elevator plant costing \$100,000, to be erected at Wausau, Wis., by the Farmers' Co-Operative Packing Company, recently incorporated, are being prepared by Gardner & Lindberg, architects and engineers, 140 South Dearborn street, Chicago. A steam power plant is provided for in the plans, which mature late in March.

New Richmond, Wis., has been selected as the site for the proposed \$100,000 cold storage, packing and elevator plant to be established in northwestern Wisconsin by the Inter-County Co-Operative Packing Company, which has just been incorporated with \$250,000 capital by W. J. Matthews, F. E. Lentz and T. J. Davies. Construction work is practically all financed.

The Green Bay Drive Calk Company, Green Bay, Wis., reported as being incorporated with \$75,000 capital, succeeds the Key Calk Horseshoe Company, which established a plant in Green Bay a year ago. Some new equipment will be purchased during the year as needed. Frank J. Van Laanen is secretary and general manager.

The report that the Western Steel & Iron Works, De Pere, Wis., has prepared plans for a large addition to its plant is unauthorized.

The Babcock Auto Spring Company, Milwaukee, will build a one-story brick factory, 30 x 100 ft., of fireproof construction.

A. F. Baumann, trustee of the defunct Dornfeld-Kunert Company, Watertown, Wis., has issued a call for sealed bids for the purchase of the entire assets, consisting of steel construction and boiler works with foundry and machine shops. Bids close March 20 at 3 p.m.

The Fox Cutlery Company, 216 Sycamore street, Milwaukee, has changed to a corporation, with an authorized capital of \$15,000. Fred Falkenhainer is manager.

C. A. and R. S. Murray have purchased the Tomah Iron Works & Garage, Tomah, Wis., and will double the shop room and purchase additional power-driven equipment. George Cousino, Rock Island, Ill., has been engaged as superintendent.

Karl Sharp, machine shop and garage, Mauston, Wis., has taken Fred Denicke into partnership and is making plans for the erection of a new shop and garage building, 65 x 92 ft.

West Allis, Wis., Common Council has instructed the city engineer to make plans for remodeling the pumping station and equipment and will soon be in the market for a centrifugal pump of 2000 gal. per min. capacity and a miscellaneous list of electrical equipment. George R. Mahoney is city clerk.

The foundry and machine shop of the Stowell Mfg. & Foundry Company, South Milwaukee, Wis., was placed on an operating basis on March 1 after a lapse of about 90 days due to lack of orders and shipping directions. The concern has booked several contracts for immediate delivery and has others in sight which give promise of continual operation during the first half, at least.

The Felker Bros. Mfg. Company, Marshfield, Wis., expects to break ground about March 20 for two reinforced concrete shop additions, each 40 x 80 ft., equipped for the production of steel culverts, barn equipment, etc. The present factory will be devoted exclusively to the welding and cutting department. It is in the market for machinery for the manufacture of stanchions and other barn equipment.

Walter Blake, general contractor and erector, Appleton, Wis., in company with N. M. Merritt, has organized the Blake Construction Company, with \$5000 capital.

Joseph Vanek and Frank Graham, Rice Lake, Wis., have established a machine shop, with a welding and cutting installation, and will build a small shop for permanent occupancy at once.

The Forsythe Leather Company, Wauwatosa, Wis., of which F. Stresau is president, has increased its capital stock by \$300,000 and will build a machine shop, garage, etc. No machinery equipment will be added.

The Prentiss-Wabers Mfg. Company, Grand Rapids, Wis., has been incorporated to take over the manufacture of stoves, kitchenettes, etc., formerly manufactured by the Prentiss Mfg. Company, Racine, Wis., with the large agricultural implement lines. G. N. Prentiss is general manager.

The N. A. Christensen Company, Milwaukee, has been incorporated with a capital stock of \$50,000 by Nels A. Christensen, R. L. Gruber and Willett M. Spooner, attorney. Mr. Christensen is president of the Christensen Engineering Company and founder of the National Brake & Electric Company, Milwaukee.

Arrangements have been made whereby the Hans Motor Equipment Company, LaCrosse, Wis., which has been in



financial difficulties, will continue operations. E. R. Richter is superintendent.

The Henning & Geasland Sheet Metal Works, Oettker Building, Platteville, Wis., has been organized to do a general sheet-metal-working business.

A new pumping station, etc., will be erected by the city of Mineral Point, Wis., this year. Plans are being made by Henry Kleinhammer, architect and engineer, Platteville, Wis.

Lorenz Brothers Macaroni Company, 890 Twelfth street, Milwaukee, will erect a plant at Booth and George streets, to cost \$75,000. Plans by Charles H. Tharinger, architect, Milwaukee, call for a three-story brick building, 90 x 132 ft.

The Ripon Automobile Company, Ripon, Wis., has made an installation of welding and cutting apparatus and will do commercial work for machinery users in Ripon and vicinity.

The Paul E. Mueller Company, Milwaukee, has been organized with a capital stock of \$50,000 by Paul E. Mueller, J. L. Batiste and H. Toussaint, all affiliated with the Mueller Company, 166 Reed street, steam and hot-water heating system builder.

The Manitowoc Electric Works, Manitowoc, Wis., has been dissolved and the business will be continued by Benjamin O. Vollendorf, who will establish a plant at Alpha, Mich., where the company is building an electric light and power plant for the village.

W. W. Williams and C. A. Callan, Milwaukee, have incorporated the Wisconsin Autowriter Company, with a capital stock of \$5000 to manufacture automatic stenographic machines and devices. Plans are still indefinite.

A. H. Kernian and Alexander Tigges, Mosinee, Wis., have established a shop for the manufacture, repair and sale of electrical devices and machinery.

## Indianapolis

INDIANAPOLIS, IND., March 8, 1915.

The former factory of the Hoosier Boiler Company, Indianapolis, has been purchased by the Weil Boiler Company, composed of Isidor and Benjamin Weil, manufacturers, Chicago. It will manufacture boilers and tanks for house-heating purposes. Charles T. Kingston is general manager. The main building is 150 x 240 ft. and an addition is to be built, making the total length 400 ft. The new company has \$50,000 capital stock.

The Federal Motor Works, Indianapolis, has reduced its capital stock to \$100,000.

The Weidely Motor Company, Indianapolis, has been incorporated with \$100,000 capital stock, to manufacture automobiles and accessories. The directors are George A. Weidely, W. Edward Showers and Edmund Rosenberg.

The Pedamobile Mfg. Company, Indianapolis, has been dissolved.

F. N. Martindale, Indianapolis, has established a plant at Franklin, Ind., for manufacturing a patented motor tractor.

The A-B-C Company, Ft. Wayne, Ind., has been incorporated with \$50,000 capital stock to do a general construction business. The directors are C. H. and E. L. Gumper and Byron Hayes.

The Diamond Veneer Company, Edinburg, Ind., has been incorporated with \$15,000 capital stock, to manufacture veneer by Martin and Homer I. Cutsinger and Oliver M. Mitchell.

The Motor Safety Device Company, Vincennes, Ind., has been incorporated with \$25,000 capital stock by Elmer Schatz, B. Whitehouse and William F. Pelzer, to manufacture automobile accessories.

John C. Kreidt & Co., Inc., Ft. Wayne, Ind., has been incorporated, with \$10,000 capital stock, to manufacture sheet metal products. The directors are John C. Kreidt, Clement Freiburger and Ray Vordermark.

The Redkey Water Company, Redkey, Ind., has been incorporated with \$25,000 capital stock, to operate a waterworks plant. Cary C. Ayres, Oscar J. Current and George A. Harrop are the incorporators.

The Noblesville Novelty Mfg. Company, Noblesville, Ind., has been incorporated with \$10,000 capital stock, to manufacture metal and other novelties. Madison H. Harrell, William Hayes and F. R. Zimmer are the directors.

The Indiana Brass Company, Frankfort, Ind., whose plant was recently destroyed by fire, will occupy a two-story brick building, formerly used by the Great Western Smelting & Refining Company.

The Imbler Fence & Mfg. Company, Anderson, Ind., has its plant in full operation turning out four carloads of wire fence a day.

The Schwab Safe Company, Lafayette, Ind., has been in-

corporated with \$75,000 capital stock, to manufacture safes and vaults. Frank Loeffler, Samuel A. Cahn and Guy Foreman are the directors.

The Brazil Clay Company, Brazil, Ind., has issued \$50,000 of preferred stock.

The Syracuse Power & Light Company, Syracuse, Ind., has increased its capital stock to \$55,000.

The Motoring Clock Mfg. Company, Sullivan, Ind., has been incorporated by B. C. Crowder, Frank M. Dale and Carl F. Briggs, with \$10,000 capital stock, to manufacture automobile accessories.

The Anderson Folder Company, Lafayette, Ind., has issued \$25,000 of preferred stock.

The Patoka Brick & Tile Company, Huntington, Ind., has increased its capital stock from \$25,000 to \$50,000.

The S. L. Sheets Construction Company, South Bend, Ind., has been incorporated with \$25,000 capital stock, to carry on a general construction and contracting business. The directors are S. L. Sheets, John Gentry and W. P. Elam.

The Eugene Atkins Company, Elkhart, Ind., has been incorporated by Eugene Atkins, Ward A. Bump and Willard H. Ellwood, with \$10,000 capital stock, to manufacture automobiles and accessories.

The Amplex Auto Works, Mishawaka, Ind., sold by a receiver to Adolph Kamm, Sr., will resume operations.

The Cotton & Sailor Mfg. Company, Elkhart, Ind., will erect a new factory.

## Detroit

DETROIT, MICH., March 8, 1915.

A better run of orders is being received by local machinery dealers and the aggregate of the week's business shows a fairly respectable total. Prospects seem to be brightening and the general feeling is one of optimism. That activity is increasing is evident by numerous inquiries from various sources for machinery and supplies for manufacturing and shop purposes. Second-hand machinery seems to be in very limited demand. Reports received from upstate manufacturing centers indicate that the industrial situation is improving quite generally, hours are being lengthened and payrolls are expanding. Building conditions remain much the same as lately reported, —quiet and with a lack of industrial construction.

An interesting announcement is to the effect that the Timken-Detroit Axle Company, Detroit, manufacturer of automobile axles, has acquired the plant and equipment of the Metal Products Company, Detroit. The new plant will be utilized in the manufacture of the smaller types of axle. The Timken-Detroit Company reports an excellent volume of new business.

The Kelsey Wheel Company, Detroit, is having plans prepared by Albert Kahn, architect, for a one-story addition to its plant, 80 x 250 ft., to be occupied by the steel press department.

One of the two buildings comprising the plant of the Ranney Refrigerator Company, Greenville, Mich., was destroyed by fire February 28, entailing a loss of approximately \$150,000. It has not been definitely decided whether the company will rebuild at once.

The Papermakers Chemical Company, Kalamazoo, Mich., is preparing to largely increase its output through addition to factory quarters and equipment. The company is capitalized at \$750,000.

New capital has been interested in the Wood Products Company, Gaylord, Mich. The name of the concern will be changed to the Michigan Wood Products Company and a number of improvements provided for, including the erection of a new dry kiln 50 x 75 ft.

The United States Pressed Steel Company, Ypsilanti, Mich., is making tentative plans for the enlargement of its plant and the installation of additional equipment. The company manufactures steel products and metal stampings.

The J. D. Swartout Company, Saginaw, Mich., has been incorporated with \$5000 capital stock to manufacture power plant equipment, etc. J. D. Swartout is the principal stockholder.

The George E. Madison Company, Muskegon, Mich., which has been organized with a capital of \$15,000, will take over the plant formerly occupied by the Henry Motor Car Company. It will manufacture boring cutters and bars designed for use in working with steel, cast iron, bronze, aluminum, etc.

The Sparta Mfg. Company, Sparta, Mich., has reorganized and reincorporated with a capital stock of \$100,000. A holding company with \$500,000 capital stock will be organized to handle the entire output of the company. The factory was formerly that of the American Specialty Company and manufactures a vending machine.

## Cincinnati

CINCINNATI, OHIO, March 8, 1915.

Foreign inquiries for lathes, still coming in, are for much larger sized machines than were bought at the opening of the war in Europe. A machine-tool builder, who has authentic information on the conditions in Europe as affecting the machine tool trade, states that hundreds of lathe orders were placed hurriedly at first, the smaller and lighter type of machines being specified. The rough usage to which these tools were put has necessitated scrapping a large number of them, which accounts for the present call for larger and heavier machines. Although the inquiry is said to have slackened somewhat, it was due to the inability of lathe builders to guarantee early delivery of the machines wanted. As the situation now stands most of them have all they can handle for several weeks, even though they are able to put on night forces, which is a somewhat difficult matter on account of the scarcity of reliable skilled labor.

Practically all makers of grinding machinery, radial drilling machines and sensitive drilling machines, report an increase in the number of orders received lately; but nearly all of this business is from abroad. The railroads continue very disappointing customers, and no known lists are out, nor are there any rumors that any of the requisitions already in the hands of executives will be passed on at an early date.

The Charles McCaul Company, Philadelphia, Pa., was the lowest bidder for the construction of the proposed Hamilton County Courthouse at Cincinnati. The bid submitted was nearly \$2,000,000, and the County Commissioners are expected to award the contract at an early date. In addition to a large quantity of building material that will be required, power plant, lighting and other mechanical equipment will be needed.

The large assembling plant of the Ford Motor Company, Walnut Hills, Cincinnati, has been completed and the necessary machinery will be installed at an early date.

The Speedwell Motor Car Company, Dayton, Ohio, whose plant has been idle for several weeks, has been placed in the hands of a receiver. It is reported that reorganization plans are under way with a view to starting operations at an early date.

The W. B. Marvin Mfg. Company, Urbana, Ohio, has been incorporated with \$50,000 to manufacture electrical equipment. C. H. Marvin, Jr., is one of the principal incorporators.

The Fritchey Metallic Packing Company, Columbus, Ohio, has been incorporated with \$50,000 capital stock to manufacture metallic packings. Conrad Fritchey is the principal incorporator.

Columbus, Ohio, is considering the erection of a new trade school building, and if present plans are successful, considerable machinery will be required for its technical department.

The Blair Motor Truck Company, Newark, Ohio, who recently increased its capital stock, expects to make a large addition to its plant some time this year.

The Atlas Portland Cement Company, New York City, has acquired a large tract of land near Piqua, Ohio, on which it proposes to erect a cement plant. Definite information is not yet available as to the size of the proposed plant.

A. R. Kennedy, care of the Chillicothe Chamber of Commerce, Chillicothe, Ohio, expects to erect a canning plant.

## Cleveland

CLEVELAND, OHIO, March 8, 1915.

The demand for machinery in this territory has become very good. The market has broadened and dealers are getting many orders, some for two or three machines, but mostly for single tools. This better demand is attributed to the improvement in general conditions, little of any of the scattered buying being due to war orders. Orders for six vertical and three horizontal boring mills have been placed the past 10 days by Akron tire manufacturers and builders of tire-making machinery. The automobile trade both in northern Ohio and Detroit are buying a lot of machinery. Dealers' stocks have become greatly reduced and there is a scarcity of lathes and power and hand milling machines. Machine tool builders report an active demand for radial drills. Builders of steel plant equipment and heavy cranes report little new demand. The call for small power plant equipment is more active.

The Cleveland Steel Barrel Company, Cleveland, Ohio, will establish a branch plant at 1001 West Eighth street, Kansas City, Mo. Floor space amounting to about 20,000 sq. ft. will be provided. Recently this company decided to enlarge its Cleveland plant; but because of establishing the Western plant, it will defer for a few months its extension in Cleveland.

The Electric Welding Products Company, Cleveland, will shortly begin the erection of a one story addition, 124x135 ft.

The W. H. Mullins Company, Salem, Ohio, has purchased a building site adjoining its present plant on which it will erect a large addition, plans for which will be prepared shortly. Some equipment will probably be required. The company reports that it is very busy at present in nearly all its departments. Increased capacity is necessitated by the growth of its automobile parts department. It has recently erected a building 120x130 ft., for use as a painting and shipping department.

The Keasey Pulley Company has under consideration the removal of its plant from Toledo to Fostoria, Ohio. It is expected that a stock subscription of \$10,000 will be raised to secure the plant for that city.

The McClurg Rubber Company, Coshocton, Ohio, is being organized to establish a rubber tire plant in the factory building of the Premium Mfg. Company. Included in the plans is the consolidation of the company with the S. & M. Tire & Rubber Company, Coshocton.

Toledo, Ohio, will receive bids March 18 for the equipment of a high-pressure pumping station. Specifications call for four motor-driven high-pressure pumps each of a capacity of 2000 gal. per min. against a 750 ft. head, and driven by 4000 volt, 25 cycle, three-phase motors.

The Refrigerating & Engineering Company, Toledo, has been incorporated with a capital stock of \$100,000 by Charles A. Peckham, vice-president and general manager of the Toledo Bridge & Crane Company, Thomas A. DeVilbiss, president of the DeVilbiss Mfg. Company, F. B. Riley and others. It will manufacture refrigerating machinery which will be built at the plant of the Toledo Bridge & Crane Company.

The Pilliod Motor Company, Toledo, Ohio, has been incorporated with a capital stock of \$100,000 by C. J. Pilliod, George S. Hartman and others, to manufacture eight-cylinder automobile motors.

A plant will be established in Lima, Ohio, by C. E. Miller, A. C. George and F. M. McGraw to manufacture light delivery automobile trucks.

The director of public service, Mansfield, Ohio, will receive bids March 15, for two deep well pumps direct-connected to alternating current motors, operating on a 2200 volt, three-phase, 60 cycle current.

The factory buildings of the General Electric Company, Fostoria, have been purchased by a group of Fostoria men who have acquired them with a view of providing sites for manufacturing enterprises.

The American Fork & Hoe Company, Swetland Building, Cleveland, Ohio, whose plant at Binghamton, N. Y., was recently destroyed with an estimated loss of about \$75,000, has not decided upon its plan of rebuilding. No immediate action is probable. W. H. Cowdery is president.

The Kelly Reamer Company, Cleveland, just made a shipment of three large combination reaming outfits, weighing approximately 800-lb., to the McIntosh & Seymour Corporation, Auburn, N. Y. One of these outfits, fitted with several interchangeable, adjustable reamers, weighed nearly 400 lb.

## The Central South

LOUISVILLE, KY., March 8, 1915.

The machinery outlook has improved considerably of late, as the result of more favorable conditions in general lines in this section. A larger volume of business is being handled in most industries of importance, and is opening the way for the placing of business which had been held back to await evidences of improvement. The boiler trade is profiting especially, more inquiries for this class of equipment being reported than for a long while. Public service companies, manufacturers and buildings requiring heating equipment are all figuring in this business. Wood-working and ice machines have been sold in larger number than for some time. Altogether, the trade outlook is more satisfactory.

The plant of the Atlas Machine Company, 715 West Market street, Louisville, was damaged by fire to the extent of \$6,000. Walter Chick is president.

The United States Quartermaster, Fort Thomas, Ky., will receive bids until March 26 for the installation of new boilers, etc., in the central heating plant there.

Power and special machinery are wanted by the Sher-a-Cola Bottling Company, Lexington, Ky. N. Macdonald is manager. The equipment of the plant will cost \$6000.

Bids will be opened by the Louisville & Nashville Railroad, Louisville, this week, for the equipment of the mechanical buildings which will serve its Lexington, Ky., terminals.



Jeff Watson & Co., Clay, Ky., who will build a garage, will need some tools for their machine shop.

Hodgenville, Ky., has let a contract for the installation of a waterworks system costing \$14,000 to John W. Snider and Albert Snider.

Lewisburg, Ky., has begun the construction of an electric light plant, for which equipment is now being purchased.

The Hooper Limestone Company, Chattanooga, Tenn., will enlarge and improve its stone-crushing plant. J. C. Sproat is manager.

Nashville, Tenn., plans to install new boilers in the municipal electric light plant, at a cost of \$40,000, and to install pumps with a capacity of 20,000,000 gal. per day at the waterworks plant, the latter improvement to be taken care of by a proposed bond issue. W. W. Southgate is city engineer.

The Morristown Chair Company, Morristown, Tenn., plans to enlarge the capacity of its factory.

The W. S. Milne Chair Company, Cleveland, Tenn., has begun the construction of a plant to take the place of that which was recently burned. The new factory will cost \$30,000.

The Stowers Mfg. Company, Harriman, Tenn., plans to install additional steam kilns for lumber-drying purposes.

E. O. Elliott, 605 McGavock street, Nashville, Tenn., is establishing a garage which will be equipped for repair work, and will handle metal and wood-working, sheet metal, etc.

The Memphis Welding Company, Memphis, Tenn., has been incorporated with \$10,000 capital stock by H. G. Betzinger, J. D. Heckle, C. A. Brust, and others.

The Electric Transmission Company, St. Charles, Va., which recently secured a large power contract from a coal-mining company in western Virginia, has announced that the capacity of its generating plant will be increased to 12,000 hp. It operates a steam plant.

The Barbour Buggy Company, Boston, Va., will establish a flour and feed mill with a capacity of 300 bbl. a day.

L. W. Bridgforth and S. B. Watkins, Kenbridge, Va., will build a flour mill.

The Delta Machine Company, Petersburg, Va., has been incorporated with \$50,000 capital stock. W. R. L. Taylor is president, and John W. Smith secretary.

The Crescent Stove Company, Evansville, Ind., plans to build an addition for the manufacture of gas ranges at a cost of \$50,000.

The Electric Service Company, Milltown, Ind., has been organized by David S. Cook, J. Harry Lemmon, Henry S. Gray, Louisville, Ky., and others, and will establish a plant there.

The Oliver Springs Garage Company, Oliver Springs, Tenn., is installing equipment for repair work.

The Cove City Lumber Company, Nashville, Tenn., has been organized with \$15,000 capital stock by John Toomey, Helenwood, Tenn., and others, and will establish hardwood sawmills on 7000 acres of timberland in North Carolina.

Clarksville, Va., is closing bids for the construction of an electric light plant. R. H. Easley is mayor.

Dayton, Va., has voted \$24,500 of bonds for building an electric light plant and waterworks.

E. H. Hoge, Gate City, Va., will build an electric light plant at Stuart, Va.

## Texas

AUSTIN, TEXAS, March 6, 1915.

The unusual amount of activity in boring oil wells in the different proved districts and in new localities of the State has caused a big increase in the demand for machinery and tools connected with that industry. General trade conditions continue to improve.

The Orange Mfg. Company, Orange, has been formed to manufacture wheelbarrows, doors and other articles of woodwork. R. E. Smith is president.

The Orange Ice, Light & Water Company, Orange, will purchase a 150-kw. generator and other equipment.

The Reeves County Irrigation District No. 1, Saragosa, embracing a large tract of land, has been formed, and bonds will be issued for constructing reservoirs and installing pumping plants. The directors are W. W. Stewart, T. M. Delaney, A. W. Wigley, C. J. Ferguson and J. F. Meier.

The Texas Power & Light Company, Austin, will construct an electric lighting system for the town of Roxton.

Roy Campbell, San Antonio, will enlarge his pre-cooling plant at Cotulla.

The City Council, Cotulla, is preparing to enlarge and improve the municipal water-works plant.

Charles E. Neal, Cotulla, is building a garage and machine shop.

The Cumby Electric Light Company, Cumby, will rebuild its electric light and power plant, which was recently destroyed by fire.

The Octo Mining Company, of Lordsburg, N. M., will install new boilers and a compressor and hoisting plant at its mines.

Boyd Smith and J. A. Wharton, Lockhart, will install new machinery in the water-works plant. They will also build an ice factory.

## St. Louis

ST. LOUIS, Mo., March 8, 1915.

Continued better feeling and, possibly, some increase in machine-tool business was noted in the trade last week. Certain types of tools, particularly lathes, etc., are still in short supply. Evidence of the development of additional interest in new enterprises and the extension of older plants continues; but no large lists of machinery are coming on the market. The demand is for single tools, with some request for second-hand material. Collections are reported good.

The Hercules Self-Starter & Machinery Company, St. Louis, Mo., has been incorporated with a capital stock of \$300,000 by John J. Cochran, H. W. Bromeyer and William Ramsey.

The St. Louis Glass Company, St. Louis, Mo., has increased its capital stock from \$50,000 to \$120,000 for the purpose of extending its plant and business.

A canning plant is to be equipped at Boonville, Mo., by L. B. Ford, Howard's station, St. Louis, Mo.

Deepwater, Mo., will receive bids until March 16 for the construction and equipment of an electric light and power station, including a 50-hp. oil engine, exciter, transformers, etc. J. P. Davis, Windsor, Mo., is the engineer in charge.

A flour mill of undetermined capacity will be equipped at Jasper, Mo., by C. A. Pyle and S. D. Steiner, Carthage, Mo.

The Cleveland Steel Barrel Company, Cleveland, Ohio, will install about \$8000 worth of machinery in its branch plant at Kansas City, Mo., and is also in the market for one 25-hp. motor etc.

The Vogel Products Mfg. Company, St. Louis, recently reported incorporated with \$25,000 capital, will manufacture air-cleansing and insect fans, electrically driven. H. F. Vogel is president.

E. C. Sooy, president of the Kansas City Hay Press Company, Kansas City, Mo., will equip a garage and machine shop for automobiles. About \$15,000 of equipment will be required.

The Springfield City Water Company, Springfield, Mo., will purchase pumping and electrical machinery in connection with the equipment of deep wells with electrically-operated pumps.

James Swafford and D. W. Jones, Bergman, Ark., will equip a cannery of about 10,000 cans daily capacity and are in the market for power and other machinery.

The Valley Oil Company, Pine Bluff, Ark., has been incorporated with a capital stock of \$80,000 by A. H. D. Perkins, E. S. Ready, Helena, Ark., and P. T. Pinckney, Pine Bluff, and will equip a cotton-seed oil mill.

The Citizens Light Company, Malvern, Ark., has been incorporated with a capital stock of \$20,000 by R. S. Brooks and Thomas Edwards.

The Co-operative Cold Storage & Canning Company, Lealie, Ark., has acquired additional quarters to its plant and will install machinery.

The Columbia Hardwood Lumber Company, Pinckney, Ark., has been incorporated with a capital stock of \$70,000 by John, Edward and W. C. Schoen and John C. Rogers, and will equip a plant.

The Pine Bluff Lumber & Box Company, Pine Bluff, Ark., has been incorporated with a capital stock of \$25,000 by Edgar and A. B. Brewster, and others.

The Independence County Manganese & Mining Company, Batesville, Ark., of which H. M. Hodges is superintendent, will install equipment and develop additional manganese mines.

An ice-cream factory will be equipped at Searcy, Ark., by F. C. Wilsey.

The plant of the Petrie Light Company, Rector, Ark., has been burned with a loss of about \$5000. It will be replaced at once.

Bristow, Okla., has granted a franchise to the Bristow Electric Company, which will install a plant at once.

The Hobart Alfalfa Mills, Hobart, Okla., have been incorporated with a capital stock of \$14,000 by I. A. Dunlap, Hobart, and C. B. Button, Rocky, Okla.

A flour mill and elevator, to cost about \$10,000, will be installed at Sallisaw, Okla., by L. C. McNabb, C. M. Gay and John Romans, and others.

The Tulsa Boiler Works, Tulsa, Okla., has been incorporated with a capital stock of \$60,000 by C. R. and C. A. Farquharson and John F. Kerrigan.

The Kreipke-Schafer Construction Company, El Reno, Okla., has been incorporated with a capital stock of \$25,000 by A. G. Kreipke, Henry Schafer and W. E. Collins and will engage in general contracting.

The Avant Glass Company, Avant, Okla., has been incorporated with a capital stock of \$15,000 by O. A. Nystrand and Harry Nystrand, Tulsa, Okla., and W. S. Floyd, Sapulpa, Okla. It will equip a glass factory.

The Famous Bottle Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$12,000 by S. K. Bernstein, Edward Speere and I. Payne, and will equip to manufacture bottles.

The Lock Stop Mfg. Company, Snyder, Okla., has been incorporated with a capital stock of \$10,000 by S. D. Bailey, Edward C. Kunke and G. A. Simmons to manufacture nut locks, etc.

The Missouri, Oklahoma & Gulf Railway, of which W. Coughlin, Muskogee, Okla., is general manager, will complete its machine and car shops, planned to cost about \$200,000.

The Oil Belt Terminal Railway Company, of which Frank Brown, Independence, Kan., is president, will equip an electric power plant near Jennings, Okla.

Ackerman, Miss., will equip an electric pumping station. The mayor should be addressed.

The Biloxi Artesian Ice Mfg. Company, Biloxi, Miss., will install machinery to increase its capacity from 75 to 100 tons per day.

The University of Mississippi, University, Miss., will install a cold storage plant and also an ice-making plant.

The Jordan River Lumber Company, Kiln, Miss., will add to its mill equipment.

Seth Matthew, Gulfport, Miss., will equip a garage and repair shop for automobile work.

W. F. Ivy, Dossville, Miss., is reported in the market for lath machines of considerable capacity.

Vivian, La., will equip a waterworks plant and install equipment together with gas engines for the power plant. The Edw. W. Gantt Company, Dallas, Tex., is the engineer in charge.

H. E. Rester, Bogalusa, La., will equip a garage and repair plant.

J. F. Estes, Paducah, Ky., will equip three manufacturing plants at and near New Orleans, La., for general purposes. His present address is the Monteleone Hotel, New Orleans.

The St. Tammany & New Orleans Railway & Ferry Company, Mandeville, La., will electrify its road from Mandeville to Covington. Harold Raymond, New Orleans, La., is consulting engineer.

## San Francisco

SAN FRANCISCO, CAL., March 2, 1915.

The machine-tool trade is improving but slowly. The Shell Oil Company has placed orders with several firms on a small list, including a few good-sized tools; and the Union Iron Works recently purchased a few special tools, of no great importance. Otherwise business is principally with small repair shops, and while the demand for second-hand tools is fairly active, little demand has appeared for new equipment. The shortage of lathes has accordingly caused no inconvenience so far, though stocks are running very low. The general machinery business continues quiet, except for a few special lines, mostly connected with agriculture and the handling of food products. Few new enterprises are being started, and some projects, that are otherwise ready to go ahead, have been retarded by heavy rains. General foundry and machine-shop work is coming out slowly. Oil-field operations except for one large interest, are at a minimum. Mining machinery is in fair demand; but little new development is under way. The outlook is favorable for further activity in shipbuilding.

The Southern Pacific Railroad is building a chemical and testing laboratory in connection with its shops at Sacramento, Cal.

It is reported that the Western Manganese Company,

of which Sumner Merrick is manager, is preparing to build a plant at Alameda, Cal., to reduce manganese ores.

San Diego, Cal., has passed an ordinance providing \$10,000 for the construction of a municipal repair shop.

The Sonoma Magnesite Company, Sonoma, controlling magnesite deposits in Sonoma County, Cal., is considering plans for the establishment of a plant near San Francisco for the manufacture of magnesite products.

The plant of the Utah Milling Company, Ogden, Utah, which was recently damaged by fire, will be rebuilt and re-equipped with new milling machinery.

The Utah-Idaho Sugar Company, Salt Lake City, Utah, is planning improvements in its various plants at an estimated cost of about \$400,000. At Lehi, Utah, a new electric sugar stack will be built and an automatic scale and other equipment installed. At Garland nine new filter presses and a new electric generator will be installed. Nine filter presses will be added to each of the plants at Idaho Falls and Sugar City, and the former will be equipped with a new turbine pump.

## The Pacific Northwest

SEATTLE, WASH., March 2, 1915.

Further effects of the European struggle are being felt in Pacific coast trade, as noted by reports of the British Columbia trade centers. Pulp mills in that vicinity have now captured the greater part of the Australian paper supply trade, and large shipments, running into more than 1000 tons per month, are being transported to the antipodes. The supply of paper formerly secured from Norway was stopped by high insurance rates, and Pacific coast mills are reaping a harvest from this source.

The lumber industry shows slightly encouraging indications—several of the largest mills on the Pacific coast having reopened the past week, and additional smaller ones are preparing to resume operations. Another field has been opened up to Seattle industries by the receipt of a cable order from the East Indies Office of the British Government, Whitehall, London, for shipment of a logging engine and equipment to Rangoon, Burmah. If first shipment is satisfactory, Seattle-made equipment will probably be installed throughout Burmah, and the approval of the British Government will undoubtedly mean the replacing of elephants and buffaloes, as now used in getting out heavy hardwood timber, by the modern engines.

The Montana Power Company, Thompson Falls, Mont., is preparing to construct a dam about nine miles below the city, preliminary to developing electrical energy in that section.

R. W. Pridham, White Building, Seattle, Wash., has awarded contract to H. D. Stewart, American Bank Building, for constructing the first unit of a mill and paper board factory, two stories, 130 x 215 ft., to cost approximately \$55,000. It is estimated that the entire plant will cost \$140,000.

The Solomon Packing Company, North Cove, Wash., has been incorporated with a capital stock of \$25,000, by Louis and Lester Solomon, and others. It plans to erect a fish-packing plant.

A controlling interest in the Ft. Benton Electric Lighting Company, Ft. Benton, Mont., has been purchased by the Montana Power Company, Great Falls. The new owners will completely overhaul the system, install new electrical equipment, etc. J. R. Hobbins will be the local engineer.

The Trustee Company, Spokane, Wash., which was granted a franchise for an electric light, power and steam-heating system in Spokane, announces that the work of constructing the system will begin early in the spring. The project will cost about \$300,000. Harry A. Floor is president.

The Field Metal Recovery Company, Maxville, Mont., is having plans prepared for the erection of a test plant. The mill will be of 1000 tons capacity, and will accommodate 11 kinds of ores.

Erick Erickson, Valdez, Y. T., Canada, is seeking permission from the Forest Service to build a sawmill on Freshwater Bay, near Tenakee. If granted, a plant with a daily capacity of 20,000 ft. will be built.

Harry Ramwell and Henry Menzel, Everett, Wash., plan building a salmon-packing cannery. A site has been secured, and it is reported work will soon begin.

The sawmill of the Eagle Pine Lumber Company, Union, Idaho, has been purchased by Clarke Brothers, Union, who will overhaul and enlarge it.

Henry Hewitt, Jr., and D. D. Bleyker, Tacoma, Wash., are reported to be managing a syndicate that will erect a plant for the manufacture of writing paper, to cost more than \$300,000.



The City Clerk, Billings, Mont., will receive bids until March 17 for a turbine pump of 1350 gal. per min. capacity and a 100-hp. motor.

The Wyoming Asbestos Producing Company, Cheyenne, Wyo., has been granted lease to one square mile of state-owned asbestos-bearing land near Casper, Wyo., providing it erects a reduction plant. A bond of \$25,000 has been given to insure the building of the plant.

The Nanaimo Electric Light, Power & Heating Company, Prince Rupert, B. C., recently filed articles of incorporation with a capital stock of \$50,000. It contemplates the erection of a light and power plant in Prince Rupert.

## Eastern Canada

TORONTO, ONT., March 8, 1915.

An effort was made in the Ontario Legislature March 3 to have the export of nickel prohibited until after the close of the war, but it was promptly negated by the government.

The Canadian Northern Railway, Toronto, is to erect a roundhouse and machine shop in Montreal.

M. T. Schurman & Co., Summerside, P. E. I., will erect a sash and door factory. New machinery will be required.

The Montreal Architectural Iron Works, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 to manufacture iron, steel and other metals. Thomas J. Coulter, William S. Jones, Charles Archibald Roberts and John Gilmore are among the incorporators.

The Union Metal Mfg. Company, Canton, Ohio, will erect a branch factory at Galt, Ont., for the manufacture of ornamental posts.

The Regal Automobile Company, Detroit, will make an addition to its factory at Berlin, Ont., and will require machinery. Mr. Nyberg is branch manager.

Batch & Rippin, Falkirk, Ont., are to erect a factory for the manufacture of cement tiles.

The Lake Erie & Northern Railway contemplates the erection of a machine shop and roundhouse at Port Dover, Ont. H. Wellwood, 28 West Mill street, Brantford, is the engineer in charge.

The Slingsley Mfg. Company, Brantford, Ont., is to erect a new boiler house.

Toronto, Ont., is to purchase water-tube boilers and mechanical stokers for its main pumping station. Tenders must be in by March 16. R. C. Harris is works commissioner.

The Western Salt Company, Ltd., Toronto, has been incorporated with a capital stock of \$250,000 to manufacture salt and chemicals. Gerard Ruel and Reginald H. M. Temple are stockholders.

The Electric Chain Company of Canada, Ltd., manufacturer of fine jewelry chains, Toronto, has been incorporated with a capital of \$50,000 by Frederic E. Earl and others.

The Deakin Construction Company, Ltd., Montreal, has been incorporated with capital stock of \$50,000 by Erastus E. Howard and Jacob De Witt, and others.

The Quikanshur Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of \$250,000 to manufacture machinery and hardware specialties. Among the incorporators are William L. Bond, John B. Johnston, Montreal, and C. A. Duclos and E. G. T. Penny, Westmount, Que.

Crown Furniture, Ltd., Preston, Ont., has been incorporated with a capital stock of \$100,000 to manufacture furniture. Austin Moss, R. A. MacGillivray and A. E. Schwalm are the incorporators.

The Ontario Government has placed \$25,000 in the estimates for alterations in the boiler house, etc., for the hospital for feeble-minded, Orillia, Ont. W. J. Hanna, Parliament Buildings, Toronto, is provincial secretary.

The Canadian business of the United States Horseshoe Company, Erie, Pa., which was recently reported to be established as the Canadian Horseshoe Company, Ltd., Hamilton, Ont., will be incorporated with a capital stock of \$200,000. It has secured a site of 4½ acres and will begin the construction of a factory within 60 days.

The Petrolia Flour Mills Company, Ltd., Petrolia, Ont., has been incorporated with capital of \$40,000 to do a milling business. W. F. Campbell, Lewis Sinclair and James Walmsley, Toronto, are the incorporators.

The Beach Cheese Box Company, Ltd., Morrisburg, Ont., has been incorporated with a capital of \$40,000 to manufacture boxes, barrels, etc. Arthur Flynn, Morrisburg, is one of the principal stockholders.

The Federal Department of Public Works, Ottawa, will receive tenders up to April 7 for a chain of buckets, tumblers, etc., for the municipal dredge. R. C. Desrochers is secretary.

The galvanizing shop of the Dominion Bridge Works, Walkerville, Ont., has been damaged by fire.

Peterborough, Ont., is to take over the distributing system of the Peterborough Light & Power Company at a cost of \$154,000.

## Western Canada

WINNIPEG, MAN., March 3, 1915.

The Portland Cement Company, Edmonton, Alberta, has gone into voluntary bankruptcy. It was capitalized at \$1,500,000, and was organized by Allan Haynes, Seattle. The liabilities and assets are not known.

Kamloops, B. C., is to expend \$35,000 for waterworks and \$40,000 for electric light purposes.

The Calgary Petroleum Products Company, Ltd., Calgary, Alberta, has been incorporated with capital of \$1,500,000. Half of the stock will be used for developing present properties. Among the directors are A. J. Seyre, A. E. Cross, William Pearce, T. J. S. Skinner, and A. W. Dingman.

## Government Purchases

WASHINGTON, D. C., March 8, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, March 23, schedule 7990, for two silent chain drives; schedule 7992, eight pressure blowers, schedule 7993, miscellaneous bench lathes; schedule 7994, one battery crane truck; all for Washington, D. C.; until March 30, schedule 8025, one automatic chucking machine for Newport; schedule 8026, 40 steel plate convertible blowers for Boston, Brooklyn, Norfolk and Charleston; schedule 8044, eight simplex feed pumps for Brooklyn; until April 6, schedule 8019, one simplex vertical pump, and schedule 8020, two 25-kw. turbo generators, all for Mare Island; schedule 8052, one double punch and shear, for Philadelphia.

## Australian Buyers of Machinery Coming

O. L. Remington, general manager, and H. B. McColl, engineer, of William McLean & Co., machinery merchants, manufacturers and importers, 115-117 Elizabeth street, Melbourne, Australia, are on their way to San Francisco, being due to arrive there April 1. After spending a few days in that city they will successively stop at the Planters' Hotel, St. Louis; Hotel La Salle, Chicago; Gibson House, Cincinnati; Hotel Statler, Cleveland, and Hotel Astor, New York. American manufacturers desiring Mr. Remington to visit their works can address him at the nearest points named. It will probably require several weeks to get from San Francisco to the Atlantic coast. Mr. Remington expects to go to England and possibly Holland for a few weeks, returning to New York, and to proceed on the return journey to San Francisco in June or July. A careful study of American machinery and machine tools will be made, especially of such as Australia has heretofore been obtaining to a large extent from countries now at war.

Savings insurance banks in Massachusetts are now permitted to issue life insurance policies for \$1000. They had been limited by law to policies not exceeding \$500. As there are four banks engaged in this business, the largest amount of insurance which any individual could secure has been \$2000, or \$500 in each bank. This amount having been doubled, a total insurance of \$4000 may be applied for by any resident of Massachusetts.

Bankruptcy proceedings have been instituted in the United States Commissioner's court at Evansville, Ind., against the Shimer Wire & Steel Company, by the Pittsburgh Steel Company, Crawfordsville Wire & Nail Company and Brazil Foundry Company. The plant was moved from Anderson four months ago. The company's capital stock is \$100,000.

## Trade Publications

**Industrial Plants.**—Charles T. Main, 201 Devonshire street, Boston, Mass. Book. Size,  $7\frac{1}{2} \times 8\frac{1}{2}$  in.; pages, 61. Illustrates a number of industrial plant buildings that have been built by this organization. These include rubber tire factories, textile mills, storage warehouses, hydroelectric developments, office buildings and power plants. Exterior and interior views of the buildings are presented, together with brief descriptions of some of the principal features.

**Drilling Machines.**—Foote-Burt Company, Cleveland, Ohio. Catalogue entitled "Railroad Shop Drilling." Shows the company's single and multiple spindle drilling machines, used for both light and heavy drilling on various classes of railroad work. The illustrations are made from photographs taken in railroad shops, and the operations shown include the simultaneous drilling of two eccentric straps, drilling cast steel brake hangers and tapping forged piston rod nuts, the drilling of eight bottom airbrake connecting rods with an eight-spindle machine guide bar, a flue sheet with two heads, five side sheets with four spindles and a flue sheet with five spindles.

**Water Softening.**—Harrison Safety Boiler Works, North Philadelphia Station, Philadelphia, Pa. Engineering leaflet No. 17. Describes the Sorge-Cochrane hot process system of softening boiler feed water, which is based upon the fact that the chemical reactions are more rapid and complete in hot water than in cold, and the precipitate is less soluble and coarser, so that it settles more rapidly. The advantages of this process of water softening, as well as the advantages of water softening itself, are gone into at some length, and a description of the apparatus with numerous illustrations is included. The results of a number of tests made on various boiler feed waters are also presented.

**Vises and Tools.**—Holland Mfg. Company, Erie, Pa. Catalogue No. 22. Gives brief descriptions of the various types of vises and pipe cutters, stocks and dies and reamers that are made. For the most part each tool is given a separate page with an illustration, brief description and table of the sizes in which it can be furnished. A brief description of the construction of the vises precedes the illustrations. The lines covered include machinists' and filers' solid jaw, filers' swivel jaw, machinists' offset and swivel jaw; woodworkers' parallel, self-adjusting and offset jaw; pipe, combination, chipping and bench vises.

**Belt Lacing.**—George W. Southwick Company, Stamford, Conn. Pamphlet. Points out the advantages of using twisted round rawhide belt lacing in place of metallic belt fastenings. These include the elimination of large lace holes and the doing away with an uneven surface on the pulley side of the belt, as well as reducing breakage of the belt. Views of a joint made by the use of this lacing and a number of special drives where it is employed are presented.

**Tumbling Barrels and Brass Foundry Equipment.**—Whiting Foundry Equipment Company, Harvey, Ill. Two catalogues. The first, No. 113, superseding No. 92, calls attention to a line of tumbling barrels which are made in a number of different styles and sizes. Illustrations of the various styles are presented with brief descriptions and tables of the sizes in which they can be supplied. A number of views of actual installations are included. The other catalogue, No. 114, superseding No. 108, refers to the way in which the company is prepared to furnish complete outfits for brass foundry plants, including furnaces, blast pipes, gratings, structural work for pits and cranes. Views of the equipment installed, together with engravings of some of the pieces themselves, are included.

**Coated Wire Nails.**—American Steel Company, Park Building, Pittsburgh, Pa. Catalogue. Shows the length, thickness and shape of heads and points of all the various styles of coated nails which this company manufactures.

**Sheet Metal Products.**—Parkersburg Iron & Steel Company, Parkersburg, W. Va. Pamphlet. Lists a line of sheet metal products that includes the galvanized and blue steel sheets of the former company and a number of products made from them by the latter company. The specialties include stove pipe and elbows and dipping pans. Special emphasis is laid upon the way in which the stove pipe and elbows are packed.

**Power Transmission Appliances.**—R. R. Street & Co., Inc., 551 Washington street, Chicago, Ill. Catalogue No. 15. Size,  $6 \times 9$  in.; pages, 144. Illustrates and describes briefly an extensive line of power transmission appliances and machine shop specialties. In connection with some of the lines covered, brief descriptions are presented, with tables of the various sizes that can be supplied. A complete telegraphic code and a comprehensive index are included.

**Springs and Screw Machine Products.**—Wallace Barnes Company, Bristol, Conn. Booklet No. 6. Pertains to a line of flat and wire springs and screw machine products. Illustrations of spring washers and special flat, drop forged

and milled, flat coil and motor, extension, compression, torsion and wire springs are presented, with a brief statement of the capacity of the plant in the various lines and data on the amount of power developed by the springs. Specifications and a number of suggestions for ordering are included, and brief mention is made of the tempering facilities. Illustrations of the various kinds of screw machine products and the department in which they are made are presented, and a number of tables of useful information are included.

**Fans.**—Buffalo Forge Company, Buffalo, N. Y. Catalogue No. 201. Presents a description with numerous illustrations of the various parts and styles of the type N Niagara conoidal multi-blade fan. The details of construction are gone into at some length, and tables of capacities and dimensions are included.

**Woodworking Machinery.**—Frank Machinery Company, Buffalo, N. Y. Collection of loose leaf circulars. Covers a line of woodworking machinery that includes planing and matching, planing and surfacing, planing, circular resawing and hand planing and jointing machines. A separate circular is devoted to each particular type of the machine and the make-up is identical in all cases with an engraving of the machine at the top followed by a brief description and a condensed specification table at the bottom.

**Welded Pipe Flanges.**—Ballwood Company, Elizabethport, N. J. Pamphlet. Concerned with a line of welded flanges for joints in pipe lines conveying steam, air, gas and liquids at high pressure. The special advantage claimed for the joints is that repairs and replacements due to defective and broken joints are eliminated. Illustrations of the joints and a header with welded flanges and nozzles are presented. Mention is also made of the pipe bending and special welding work done by this company.

**Presses.**—V. & O. Press Company, Station J., Brooklyn, N. Y. Collection of bulletins. Describe a line of presses including machines of the inclinable, punching, arch power, forming and wiring, straight sided, reducing and foot power types, a separate bulletin being devoted to each style. Illustrations of the various parts of the machines are presented in each case, together with brief tables of specifications. Mention is also made of automatic attachments for power presses and a line of sheet metal working machinery.

**Engines.**—Hellman Machine Works, Pine and First streets, Evansville, Ind. Catalogue No. 66. Mentions a line of engines that includes traction, portable and stationary types, together with the boilers and pumps used in conjunction with them. Illustrations of the various styles are presented, with brief descriptions and condensed tables of specifications. Space is also given to a line of woodworking machinery and mine cages.

**Steel Fence Posts.**—National Steel Post Company, Cedar Rapids, Iowa. Pamphlet. Illustrations and descriptive matter explain the construction of a line of spring steel fence posts, wire fences, gates, etc. The special advantage claimed for these posts is that no digging of holes is necessary as the post is made from steel formed to the peculiar shape used and can be driven into the ground easily.

**Automatic Motor Starters.**—Allen-Bradley Company, 495 Clinton street, Milwaukee, Wis. Bulletin No. B-7, superseding Nos. B-7 to 12. Describes a current limit type of automatic starter for direct-current motors. The special features of the starter are that all the operating parts are located on the front of the slate panel and the resistance is obtained through the imperfect contact between the surfaces of a column of graphite disks. The various forms of starter are briefly described, followed by illustrations and a table of dimensions. The accessories for use in connection with the starter are also mentioned.

**Long Distance Electric Transmitting and Recording System.**—Bristol Company, Waterbury, Conn. Bulletin No. 192. Describes a long distance electric transmitting and recording system for indicating and recording pressure, liquid level, temperature, etc., and transmitting the records electrically over long distances. In the system the indications are sent from one or more transmitting instruments to a recording receiver, the conditions at any particular transmitting point being indicated by switching that particular transmitter into the circuit. Where only one transmitting instrument is employed, either an indicating or recording receiver, or both, may be used. The various combinations that can be employed are illustrated, and the construction of the transmitting instrument is gone into at some length. An illustrated description of this system appeared in *The Iron Age* November 26, 1914.

**Seamless Tubing.**—Ellwood Ivins' Tube Works, Oak Lane Station, Philadelphia, Pa. Card and sample. The sample presents an idea of the finish secured on this company's product, an illustration on the card serving to show to some slight degree the great variety of sizes and styles of tubing made.





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